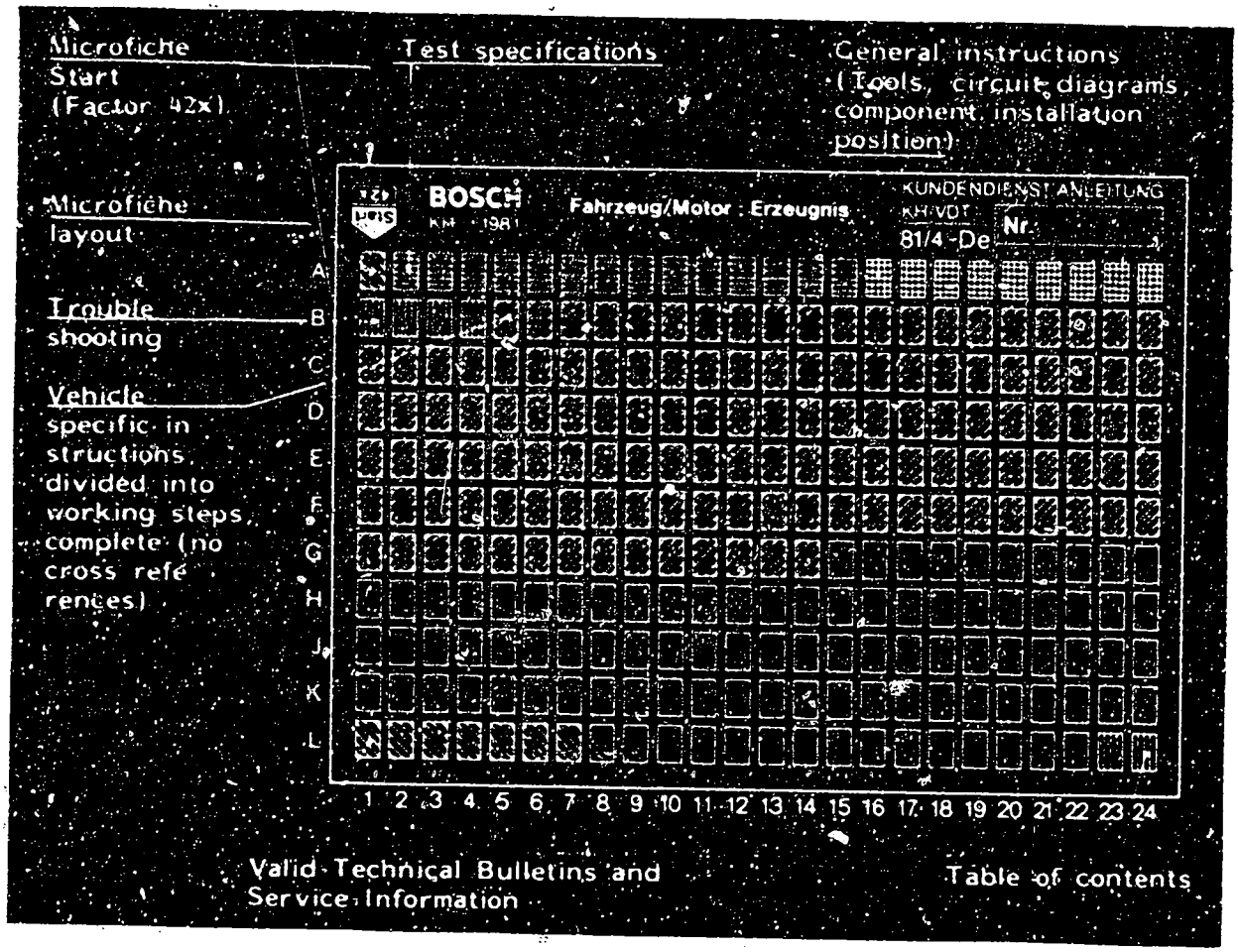
Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E16	Product/assembly/test step Vehicle/engine	

Coordinate

3. Limits of section

Beginning	Mid-section	End	One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

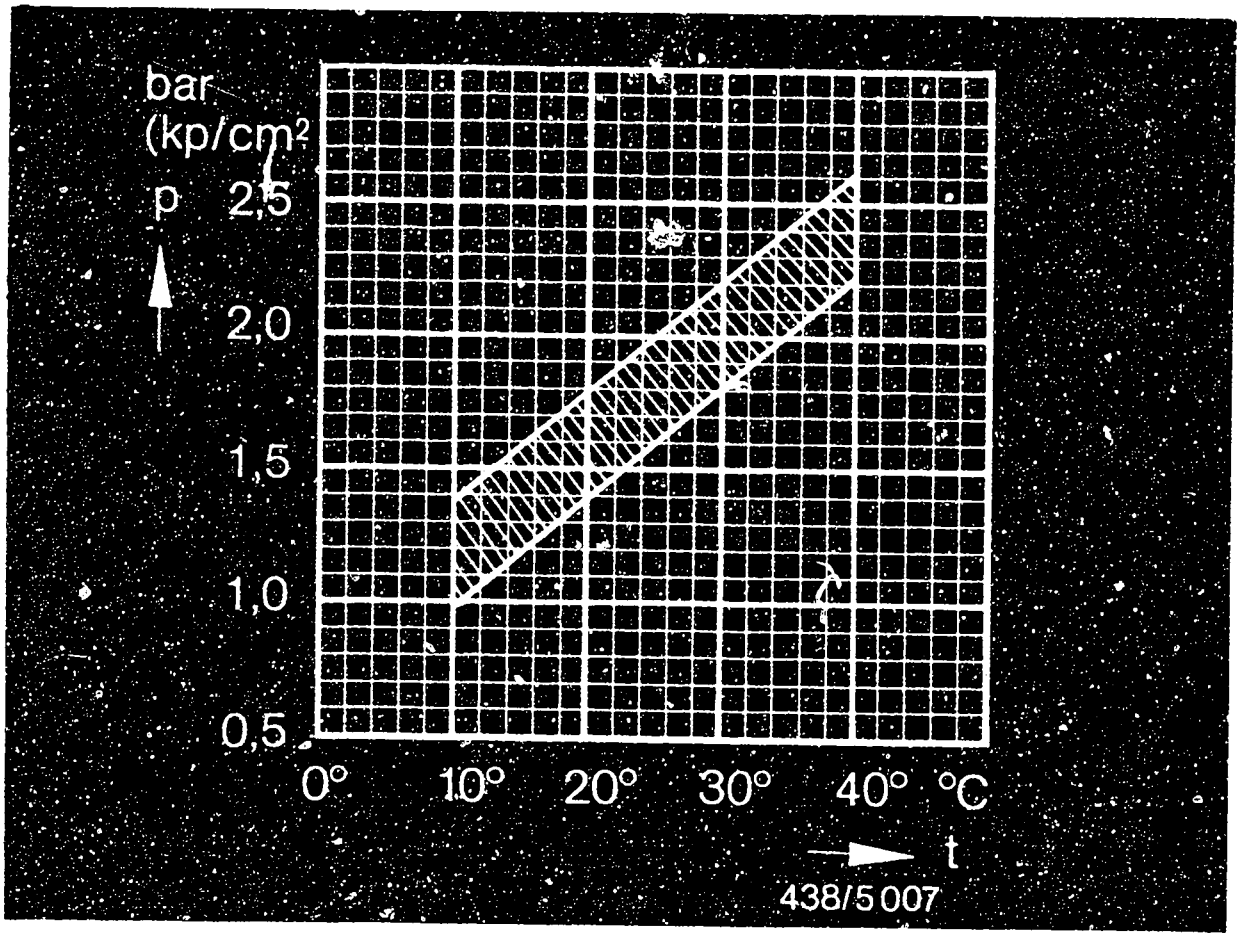
A1	Trouble-Shooting Plan	

1. Test specifications

1.1 Electric fuel pump

B 22

Test step	Test specifications
Fuel delivery:	min. 850 cm^3/30 s



p = Control pressure (gauge pressure)
t = Ambient temperature

C8

1.2 Control pressure "cold"

For testing, connect vacuum pump to intake-manifold-pressure connection of warm-up regulator.
Setting value: 510...550 mbar
(385...415 mmHg)
Part no. of warm-up regulator: 0 438 140 005
0 438 140 106
0 438 140 107
(Versions for intake-manifold-pressure-controlled full-load enrichment).

Test step	Test specifications*

C8

1.3 Control pressure "warm"

(Versions for intake-manifold-pressure-controlled full-load enrichment).

- Test at atmospheric pressure (without vacuum):

Part no. of warm-up regulator	
0 438 140 005	2.7...3.1 bar (2.8...3.2 kgf/cm²)
0 438 140 106	2.5...2.9 bar (2.6...3.0 kgf/cm²)
0 438 140 107	2.7...3.1 bar (2.8...3.2 kgf/cm²)

- For testing, connect vacuum pump to intake-manifold-pressure connection of warm-up regulator.

Setting value:
510...550 mbar
(385...415 mmHg)

Part no. of warm-up regulator	
0 438 140 005	3.4...3.8 bar (3.5...3.9 kgf/cm²)
0 438 140 106	3.55...3.95 bar (3.65...4.05 kgf/cm²)
0 438 140 107	3.55...3.95 bar (3.65...4.05 kgf/cm²)

* Pressures in the test specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure)

Test step	Test specifications*
1.4 Leak test on full-load diaphragm — **D6**	
Setting value: 510...550 mbar (385...415 mmHg)	
Part no. of warm-up regulator 0 438 140 005 0 438 140 106 0 438 140 107	
Maximum pressure drop	100 mbar (75 mmHg)/15 s
1.5 Primary pressure — **D9**	
Part no. of fuel distributor	
0 438 100 028 Checking value	4.5...5.2 bar (4.6...5.3 kgf/cm²)
0 438 100 108 Setting value	4.7...4.9 bar (4.8...5.0 kgf/cm²)
1.6 Leak test — **D16**	
Minimum pressure	
after 10 minutes:	2.0 bar (2.1 kgf/cm²)
after 20 minutes:	1.7 bar (1.8 kgf/cm²)
1.7 Injection valves — **E14**	
0 437 502 006	
Opening pressure:	2.7...3.8 bar (2.8...3.9 kgf/cm²)

* Pressures in the test specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure).

Test step

1.8 Fuel distributor

F1

Delivered-quantity comparison at the outlets:

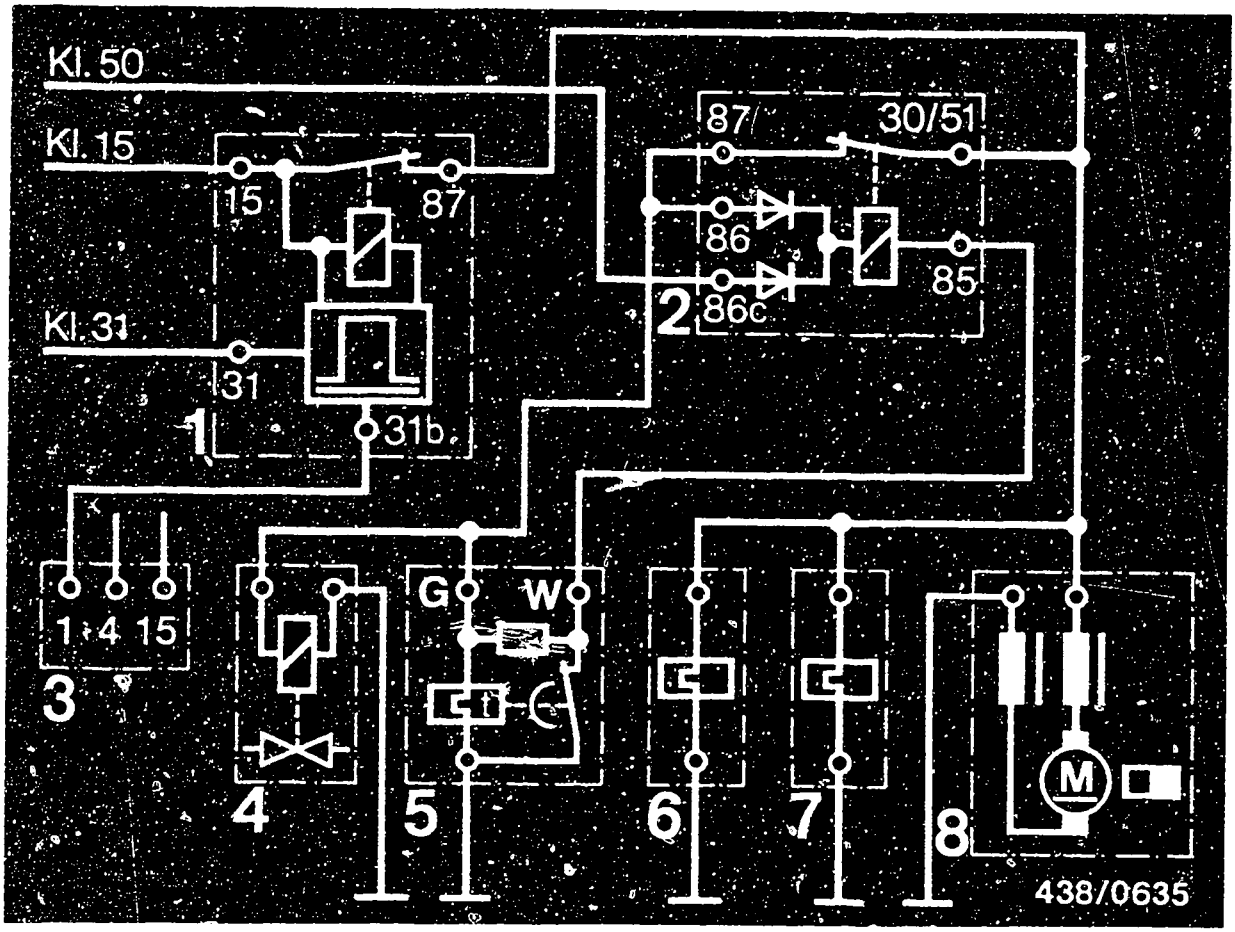
Part no. of fuel distributor 0 438 100 028	Setting point $cm^3/min.$	Max. allowable delivery $cm^3/min.$
Idle	6.0	6.8
Part load	40.0	43.0
Full load	145.0	160.0
Part no. of fuel distributor 0 438 100 108	**Setting point $cm^3/min.$**	**Max. allowable delivery $cm^3/min.$**
Idle	6.0	6.7
Part load	40.0	43.0
Full load	120.0	131.0

1.9 Idle adjustment*

F12

Idle speed:	
323i	
520i	800...900 min^{-1}
CO concentration:	
323i	1.0...2.0 % by vol.
520i	0.5...1.5 % by vol.

* Engine at normal operating temperature (oil temperature approx. 80°C).
Air conditioner switched off.



- BMW 323i as from 1978 model

1 = Electronic relay
2 = Extended-injection relay
3 = Ignition coil
4 = Start valve
5 = Thermo-time switch
6 = Warm-up regulator
7 = Auxiliary-air device
8 = Electric fuel pump

2. Electrical safety circuit

2.1 Circuit diagrams

The safety circuit employs an electronic relay which is triggered from terminal 1 of the ignition coil.

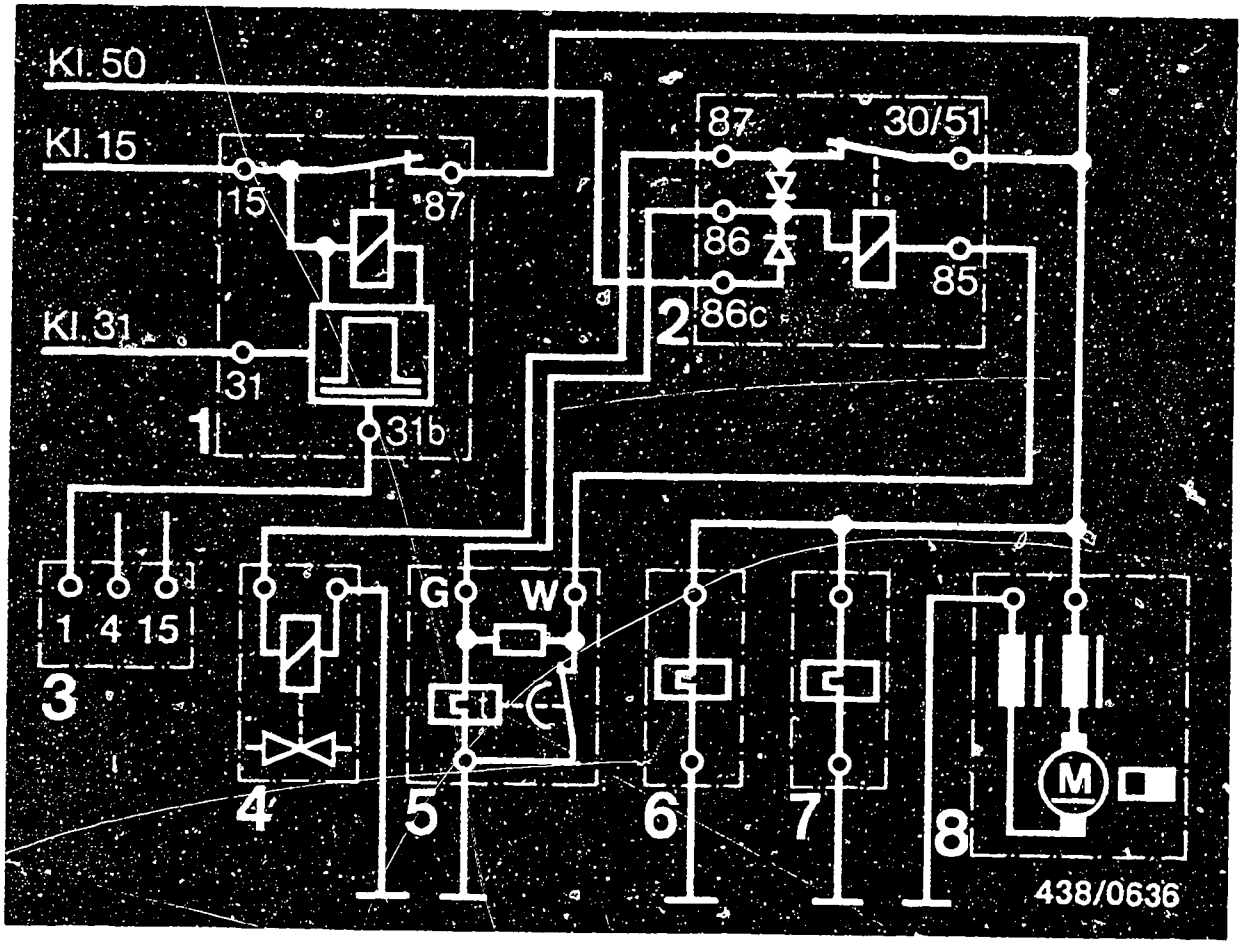
With this safety circuit the control valve is triggered not only by the thermo-time switch, but also by a prolonged-injection relay.

The start valve and terminal "G" of the thermo-time switch are jointly connected to terminal 87 of the prolonged-injection relay.
Prolonged-injection relay BMW No.: 61 31 1 362 224.

If the complaint "poor cold starting" is encountered on these vehicles, the cause may be the shunt resistor in the thermo-time switch. The residual holding current at the prolonged-injection relay then leads to overenriching of the mixture by the start valve.

The situation is remedied by using a new relay and by modifying the wiring.
New prolonged-injection relay BMW No.: 12 63 1 269 274.
The electrical circuit should be modified in accordance with the 1979 model (next coordinate).

To do this, remove the jumper between terminal 86 and terminal 87. Check the connections in the socket housing. Terminal 86 leads to terminal "G" on the thermo-time switch, and terminal 87 leads to the start valve.

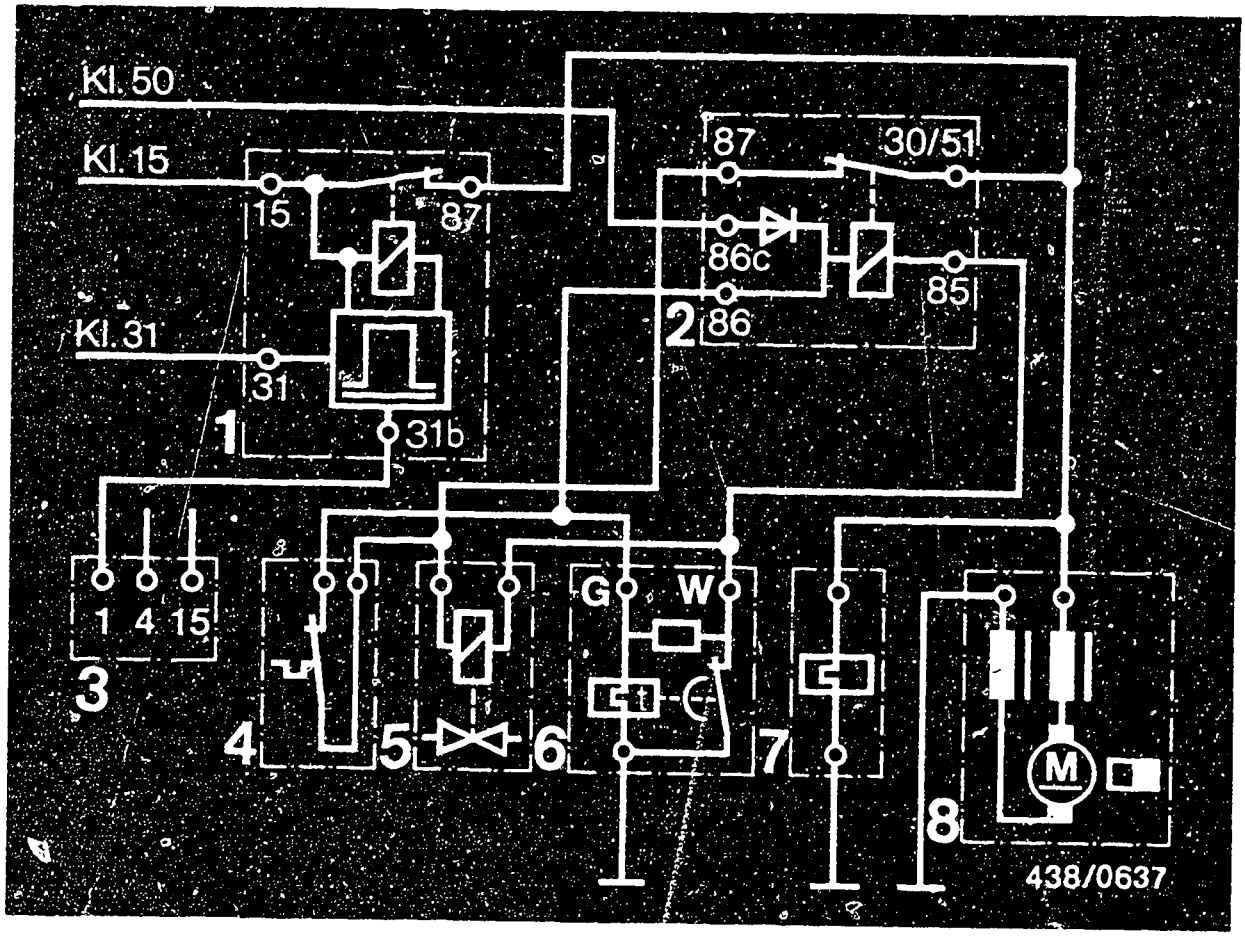


- BMW 323i as from 1979 model

1 = Electronic relay
2 = Prolonged-injection relay
3 = Ignition coil
4 = Start valve
5 = Thermo-time switch
6 = Warm-up regulator
7 = Auxiliary-air device*
8 = Electric fuel pump

Modified diode arrangement in prolonged-injection relay. The start valve and terminal "G" of the thermo-time switch are separately connected to terminals 87 and 86 respectively of the relay.
Prolonged-injection relay BMW No.: 12 63 1 269 274.

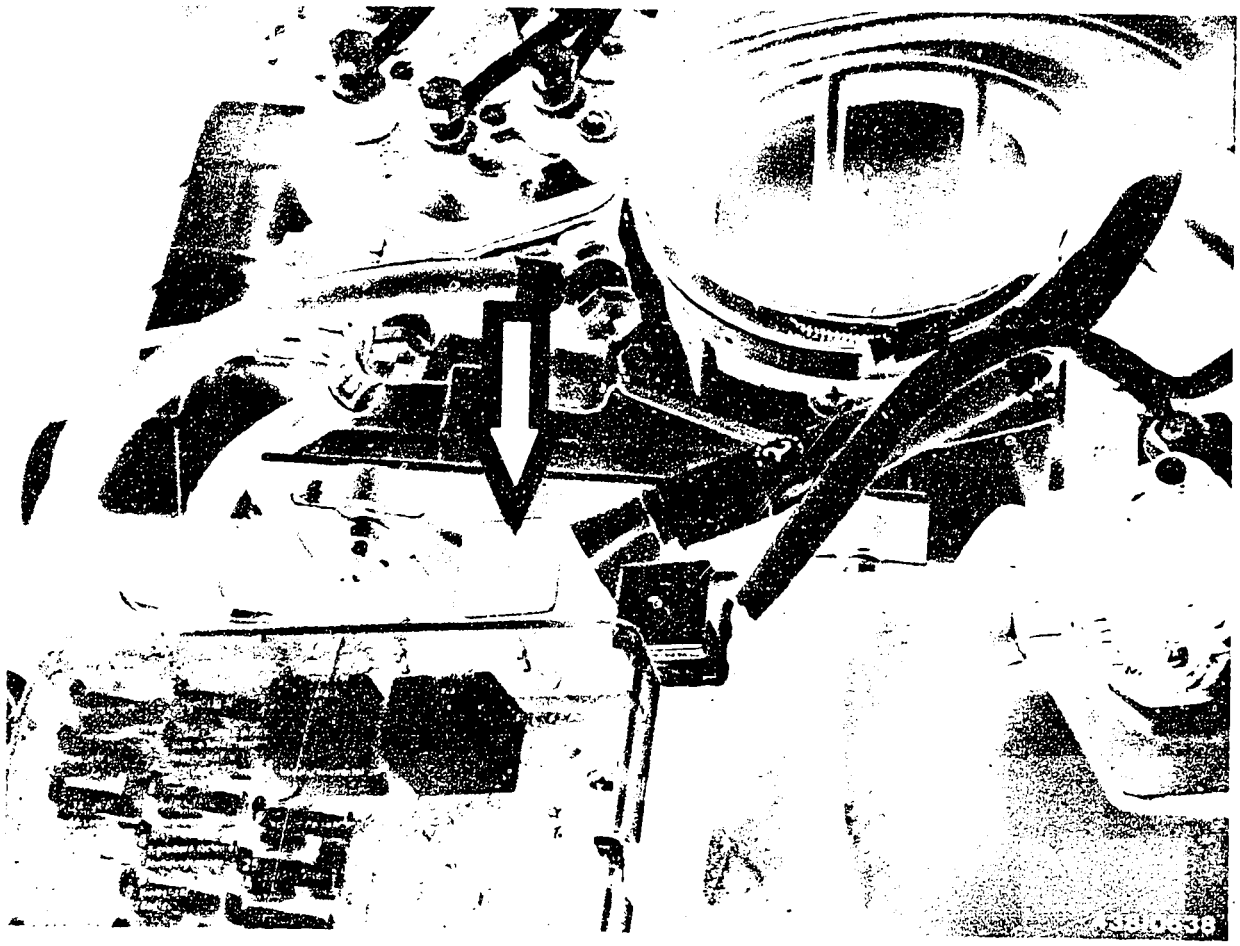
* Up to and including 1981 model.
Discontinued as of 1982 model.



- BMW 520i as from 1981 model

1 = Electronic relay
2 = Prolonged-injection relay
3 = Ignition coil
4 = Thermo-switch
5 = Start valve
6 = Thermo-time switch
7 = Warm-up regulator
8 = Electric fuel pump

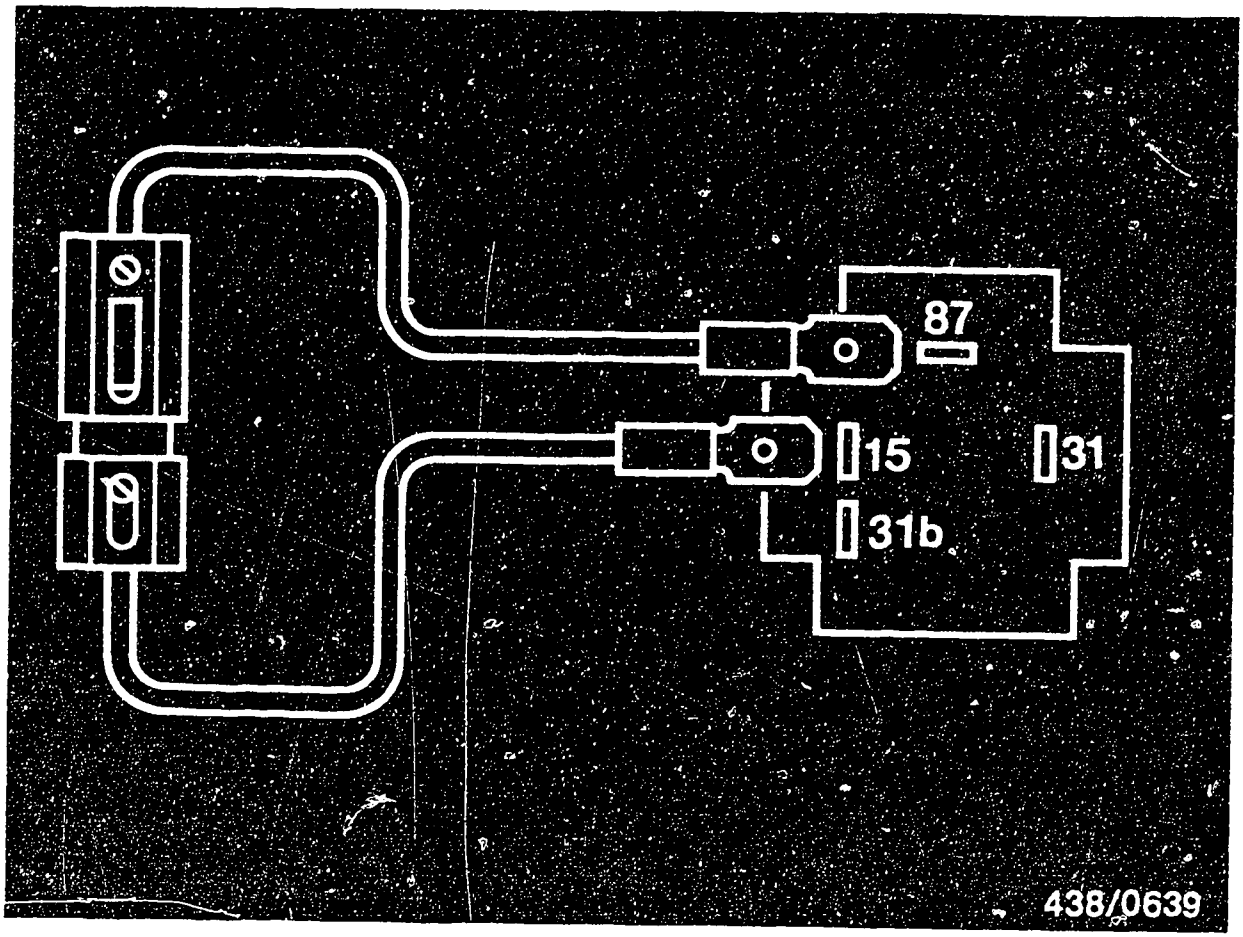
Additional thermo-switch. Switching temperature 0°C.
At temperatures below 0°C the thermo-switch is closed, and the prolonged-injection relay operates.
At temperatures above 0°C the thermo-switch is open, and the prolonged-injection relay does not operate.



2.2 Bridging the safety circuit

In order to carry out testing with the engine stationary, it is necessary to bridge the safety circuit.

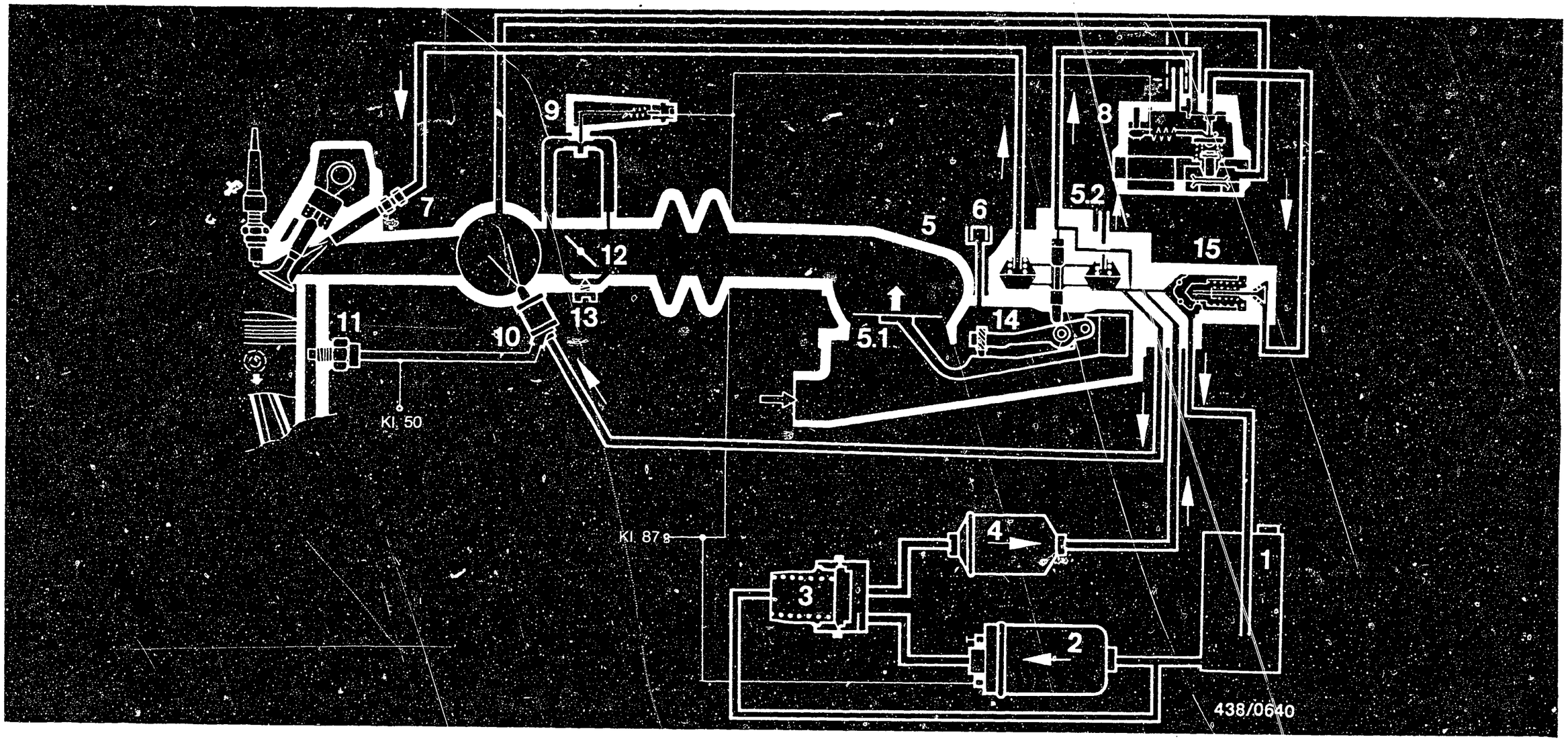
To do this pull the electronic relay (arrow), positioned on the left hand side on the wheel arch, out of its base.



Connect contacts 15 and 87 in the base with a bridge.

Use connecting cable 1.5 mm² with fuse holder and 16 A fuse (to be user-fabricated according to sketch).

Electric fuel pump, warm-up regulator and auxiliary-air device (up to 1981 model) are now supplied with battery voltage.



3. Diagram of fuel lines

1 = Fuel tank
2 = Electric fuel pump
3 = Fuel accumulator
0 438 170 019 with bleeder screw
0 438 170 021 with leakage line
4 = Fuel filter
5 = Mixture-control unit
5.1 = Air-flow sensor
5.2 = Fuel distributor
6 = Fuse cap
7 = Injection valve
8 = Warm-up regulator
0 438 140 005 hose connection at top
0 438 140 106/107 hose connection at side
9 = Auxiliary-air device (as of 82 model water-heated)
10 = Start valve
11 = Thermo-time switch
12 = Throttle valve
13 = Idle-speed-adjusting screw (bypass)
14 = Idle-mixture-adjusting screw
15 = Primary-pressure regulator with push valve

4. General information

4.1 Introduction

The vehicles BMW 323i and 520i are supplied with 6-cylinder engine with K-Jetronic in the following designs:

European models

Vehicle type	Engine type	
323i	2.3 l	as from 1978 model
520i	2.0 l	as from 1981 model

This repair manual refers only to the above-mentioned vehicles and gives a concise description of the testing and adjustment operations to be performed on the vehicle on the K-Jetronic.

All the system components are dealt with in separate working steps with the corresponding test specifications. In addition to this repair manual the appropriate testing and repair manuals will, of course, be issued for every other vehicle type equipped with the K-Jetronic.

The K-Jetronic differs from other known fuel-injection systems in terms of both construction and operation. In order to be able to carry out the testing procedures described in this manual - and therefore to be able to assess the components - the K-Jetronic and its operation should be clearly understood. The essential points of the operation and construction of the K-Jetronic are described in Technical Instruction VDT-U 3/1 En.

When trouble-shooting the K-Jetronic, it is assumed that the ignition is in order and that the engine is in proper mechanical condition.

The individual test steps of this repair manual are detailed and self-contained. This permits direct trouble-shooting without having to go through the entire test program for each fault.

The trouble-shooting chart on Coordinates B 1 - B 4 is intended to make it easier to decide which test steps have to be carried out for certain faults.

According to the symptom stated by the customer or which you yourself have determined, select the possible cause in the trouble-shooting chart. The coordinate at the end of the cause column refers to the appropriate test step with the associated test specification.

Important note:

If any fuel connections are loosened, parts removed, also on the vacuum system, always use new seals when re-connecting or re-installing.

Ensure utmost cleanliness when working on the K-Jetronic. Fuel connections must be cleaned thoroughly on the outside before opening.

4.2 Design

The entire system of the K-Jetronic in these vehicle types corresponds, with the exception of the differences listed below, to the basic design as described in Technical Instruction VDT-U 3/1 En.

4.3 The following components are different or extra:

- Electric fuel pump with replaceable non-return valve.

- Fuel accumulator with doubled storage volume (40 cm^3).
  On accumulator 0 438 170 019 the spring chamber is vented to atmosphere via a screw.
  On accumulator 0 438 170 021 the spring chamber is connected by means of a hose piece to the intake line of the electric fuel pump.

- 6-cylinder mixture-control unit with updraft air-flow sensor.

- Fuel distributor with adjustable differential-pressure valves. In this type of fuel distributor, screw plugs are situated adjacent to the fittings for the fuel-injection lines.
  This possibility for adjustment has only been introduced for production at the works. This does not result in any additional adjustment possibilities for the After-Sales Service Organization. For this reason, the fuel distributor is to be dealt with in precisely the same manner as the conventional model.
  The screw plugs must not be removed or loosened.

- Warm-up regulator for intake-manifold-pressure-controlled full-load enrichment.
  Warm-up regulator 0 438 140 005 - intake-manifold-pressure connection port on top part of housing.
  Warm-up regulator 0 438 140 106/107 - intake-manifold-pressure connection port on intermediate plate.

- Up to 1981 model auxiliary-air device electrically heated. As of 1982 model water-heated auxiliary-air device (not made by Bosch).

- Electrical safety circuit. The components electric fuel pump, warm-up regulator and auxiliary-air device (up to 1981 model) are triggered by an electronic relay. Thus, with the engine stopped and the ignition on, the electric fuel pump will not start to operate and the warm-up regulator and auxiliary-air device will not shut off prematurely.

- Due to the so-called prolonged-injection relay the start valve injects during cold starting not only during the starting period, but throughout the entire switching time of the thermo-time switch.

- Due to the thermo-switch in the 520i, prolonged injection takes place only at temperatures below 0°C.

- Vehicles with an air conditioner are equipped with a solenoid-operated air valve for stabilizing the engine speed.

- The 520i is fitted with a manifold-pressure-controlled throttle-valve positioner. This opens the throttle valve slightly during starting.

- Vehicles of the Sweden version are equipped with a vacuum limiter (opens only on the overrun).

5. Test equipment and tools

- Pressure tester KDJE-P 100 (previously KDEP 1034).
  For testing all fuel pressures and testing for leaks.

- Connecting-parts set KDJE-P 100/10 (previously KDEP 1034/10).
  For connecting pressure tester to the control-pressure port of the fuel distributor.

- Adjusting wrench KDEP 1035.
  For adjusting the idle-mixture-adjusting screw in the mixture-control unit (CO-adjustment).

- Guide ring KDEP 1040/10 (dia. 80 mm)
  For centering the air-flow sensor plate in the air-flow sensor.

- Tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).
  For comparing the fuel delivered from the individual fuel-distributor outlets.

- Graduate (commercially available, capacity approx. 1.5 l)
  For measuring the delivery of the electric fuel pump.

- Electric connecting cable (test lead).
  KDJE 7450/70 for the direct connection of components to be tested, e.g. cold-start valve.

- Vacuum pump (commercially available).
  For testing warm-up regulators with full-load mixture enrichment dependent on intake-manifold pressure.
  e.g. vacuum hand pump "Mityvac" from
  Firma Korinth
  Ludwig-Kloos-Strasse 21
  6450 Hanau 7 (Steinheim)

- Set of tools for the removal and fitting of idle-CO-anti-tamper device of air-flow sensor.
  (e.g. No. 131 090 from the firm Cartool, Hans Schubert KG, Unterer Grasweg 88, D-8070 Ingolstadt).

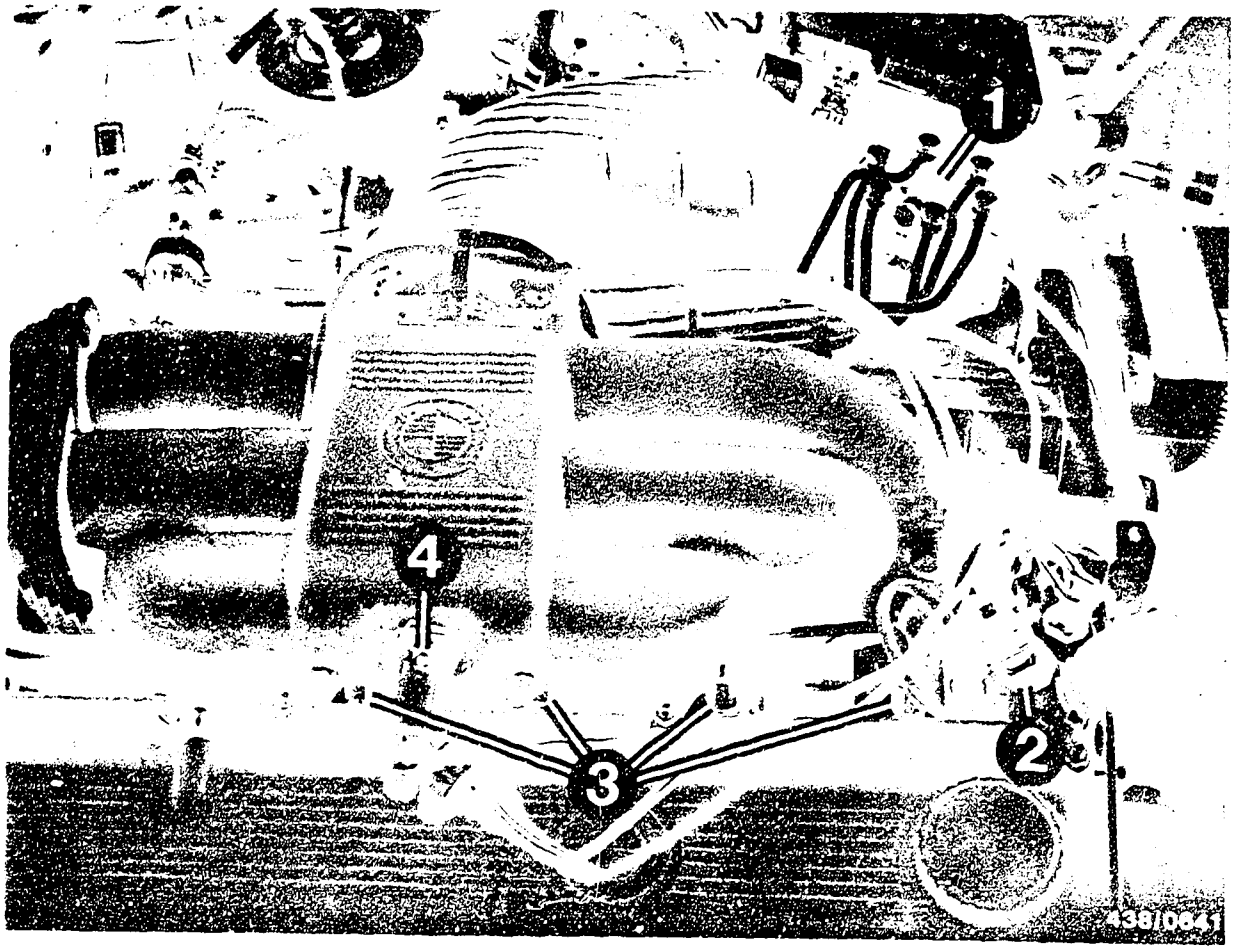
- Valve tester KDJE-P 400 (previously KDJE 7452).
  For testing the injection valves.

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135) or
Bosch, Part Designation VS 14 942-CH
previously Part No. 5 973 340 650
The Bosch calibrating fluid can be obtained in 5 l metal cans from the following supplier:
Firma
Oskar Gnamm GmbH & Co
D-7531 Kämpfelbach-Bilfingen

Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids. Even with calibrating fluid, be sure to observe the local official regulations.

- Tachometer (commercially available).
  For idle-speed adjustment.

- CO meter (commercially available).
  For idle-speed CO adjustment

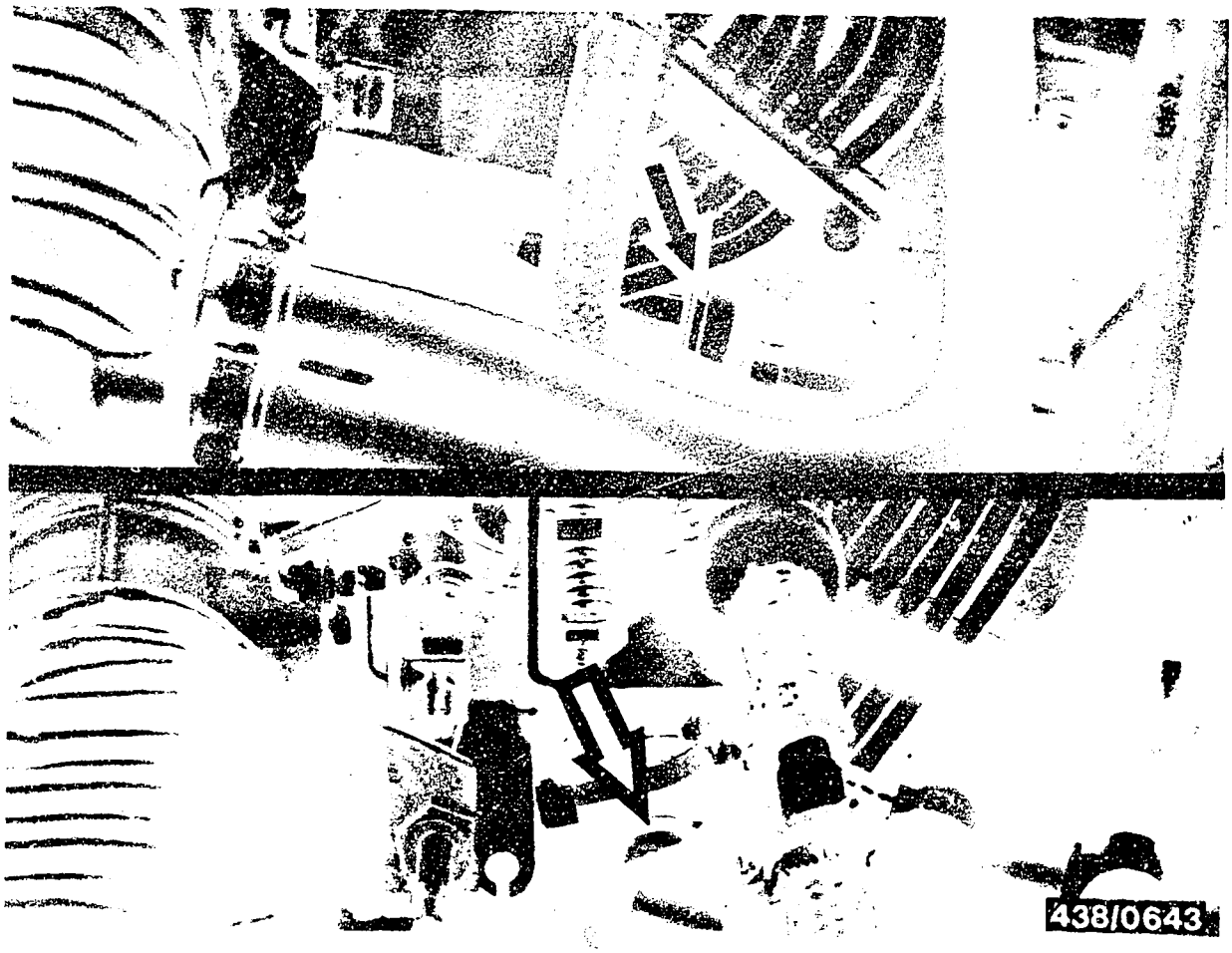


1 = Mixture-control unit
2 = Thermo-time switch
3 = Injection valves
4 = Start valve

6. Installation position of individual components

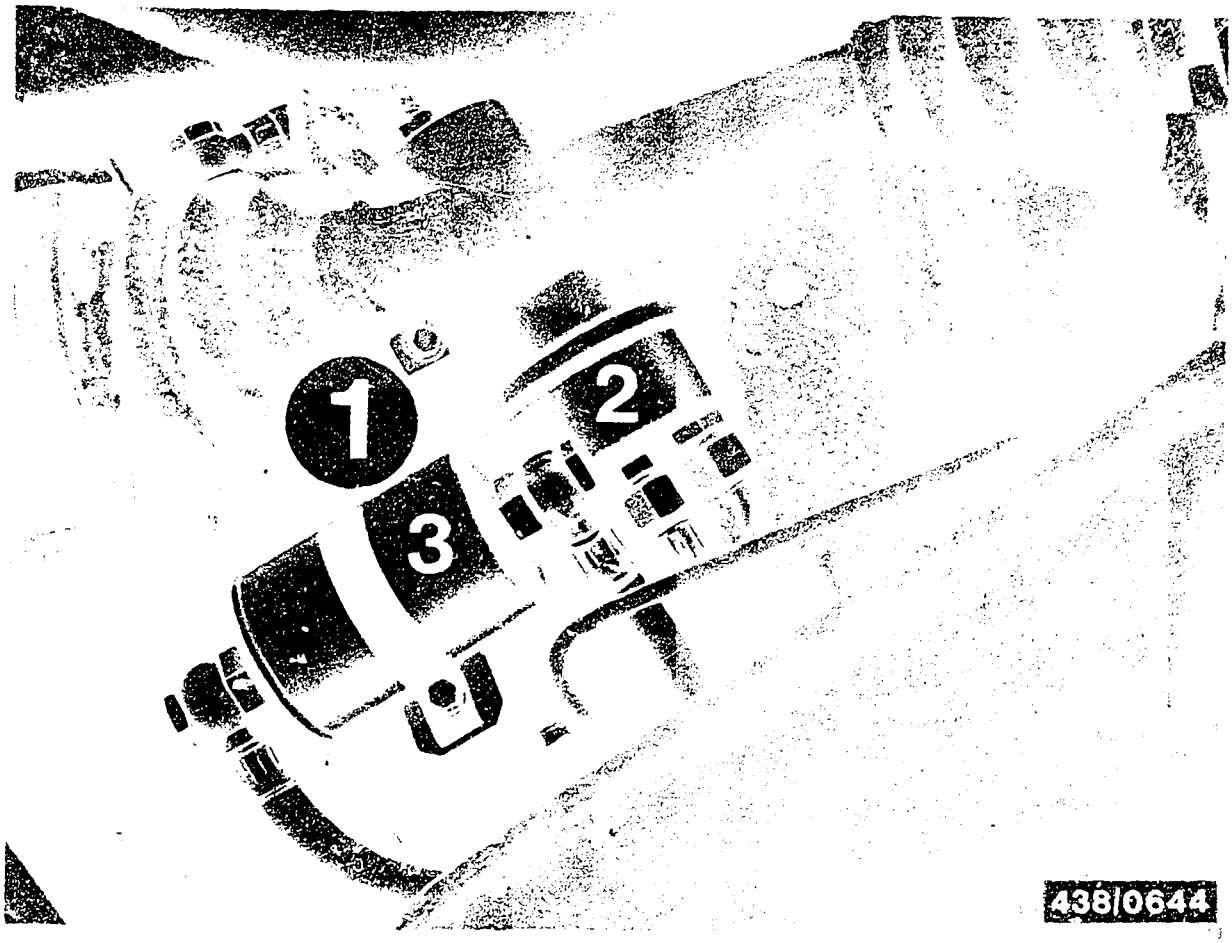
6.1 Arrangement of components on the engine

1 = Warm-up regulator
2 = Mixture-control unit
3 = Throttle-valve positioner



Arrow in upper picture shows electrically heated auxiliary-air device.
In vehicles up to 1981 model.

Arrow in lower picture shows water-heated auxiliary-air device (not made by Bosch).
In vehicles as from 1982 model.



1 = Electric fuel pump (partly hidden)
2 = Fuel accumulator
3 = Fuel filter

6.2 Fuel-supply components

The electric fuel pump, fuel accumulator and fuel filter are located on a common mounting piece above the rear axle, on the right-hand side as viewed from behind the vehicle.
Before replacing one of these components, the connections should be thoroughly cleaned.
Before loosening the connections, pinch off the intake hose of the electric fuel pump so that no fuel can escape (e.g. using hose clamper W 157 from Matra Co.).

7. Trouble-shooting chart

Customer complaint (fault symptom)

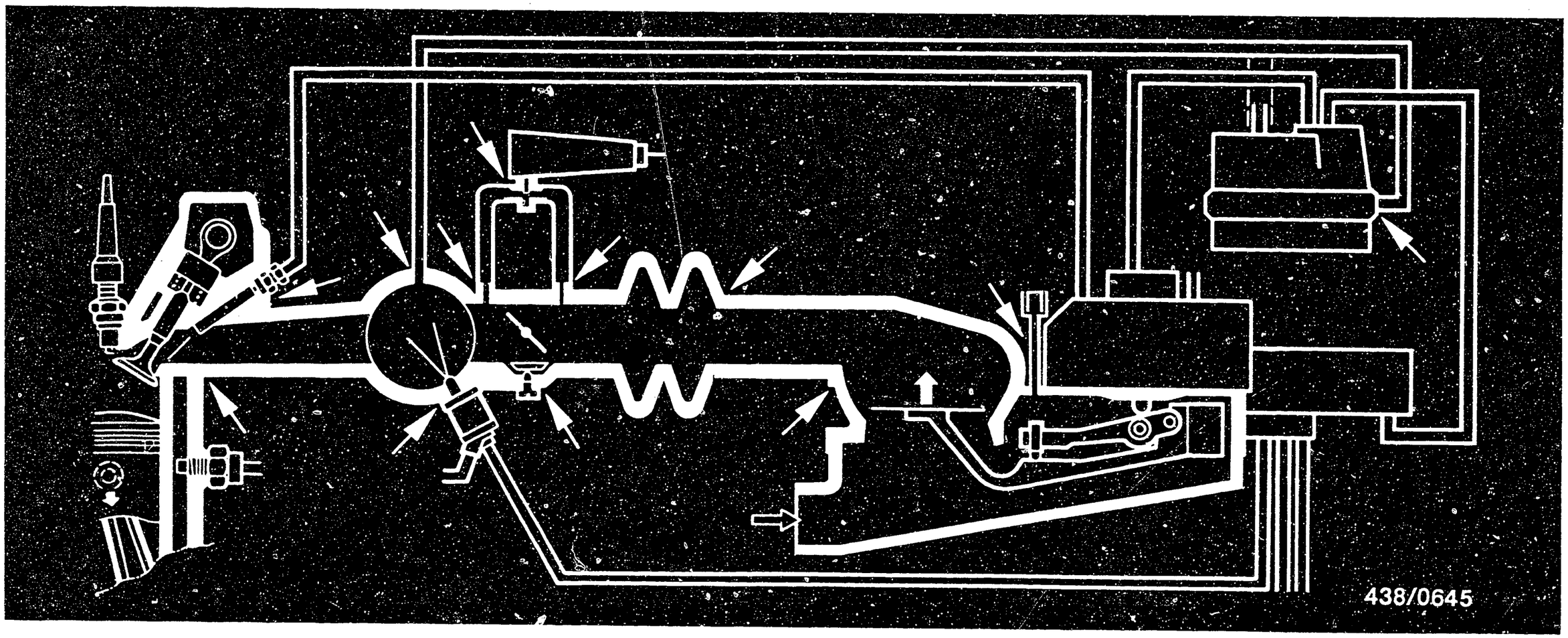
1. Engine does not start, or starts poorly, in cold condition	2. Engine does not start, or starts poorly, in warm condition*	3. Irregular idling during the warm-up phase (shakes)	4. Irregular idling with warm engine (shakes)	5. Engine does not draw gas, burbles	6. Engine misfires when operating on the road, high load	7. Insufficient power	Cause	Coordinate
	●	●	●	●		●	Vacuum system leaking	B5
●	●		●	●	●	●	Air-flow sensor lever and/or control plunger not moving smoothly	B7
	●						Position of the air-flow sensor plate incorrect	B15
●		●					Auxiliary-air device does not open	B19
●	●				●		Electric fuel pump not operating	B22
●							Cold-start system defective	C3
		●	●				Cold-start valve leaking	C3
				●			Excessive fuel quantity for control-pressure circuit	C12
●		●					"Cold" control pressure outside tolerance	C8
	●		●	●	●	●	"Warm" control pressure too high (after warm-up)	C8
			●	●		●	"Warm" control pressure too low (after warm-up)	C8
					●	●	Primary (system) pressure outside tolerance	D9
	●						Overall fuel system leaking	D16
●	●	●	●		●		Injection valves leaking, opening pressure too low	E14
●	●	●	●			●	Unequal fuel delivery (imbalance of fuel delivery)	F1
●	●	●	●	●			Basic idle adjustment incorrect	F12
						●	Throttle plate does not open completely	--

*Note

If, in the case of Symptom 2, after checking and repairing all the fault causes listed below, the hot-start characteristic is still unsatisfactory this can be improved by fitting an impulse relay.
The fitting of this relay is described in Coordinates L 5.

Customer complaint (fault symptom) (continued)

8. Engine runs on after being switched off ("diesels")	9. Fuel consumption too high	10. Flat spot during acceleration	11. CO concentration during idling too high	12. CO concentration during idling too low	13. Idle-speed cannot be adjusted (too high)	14. Engine starts but then immediately stops	Cause	Coordinates
		●		●			Vacuum system leaking	B5
●		●	●	●			Air-flow sensor lever and/or control plunger not moving smoothly	B7
●							Position of the air-flow sensor plate incorrect	B15
							Auxiliary-air device does not open	B19
					●		Auxiliary-air device does not close	B22
						●	Electric fuel pump not operating	C3
							Cold-start system defective	C3
●	●		●				Cold-start valve leaking	C12
		●				●	Excessive fuel quantity for control-pressure circuit	C8
		●				●	"Warm" control pressure too high (after warm-up)	C8
	●	●	●			●	"Warm" control pressure too low (after warm-up)	C8
		●				●	Primary (system) pressure outside tolerance	D9
							Overall fuel system leaking	D16
●							Injection valves leaking, opening pressure too low	E14
		●					Unequal fuel delivery (imbalance of fuel delivery)	F1
●	●	●	●	●			Basic idle adjustment incorrect	F12
							Throttle plate does not open completely	--



Working steps

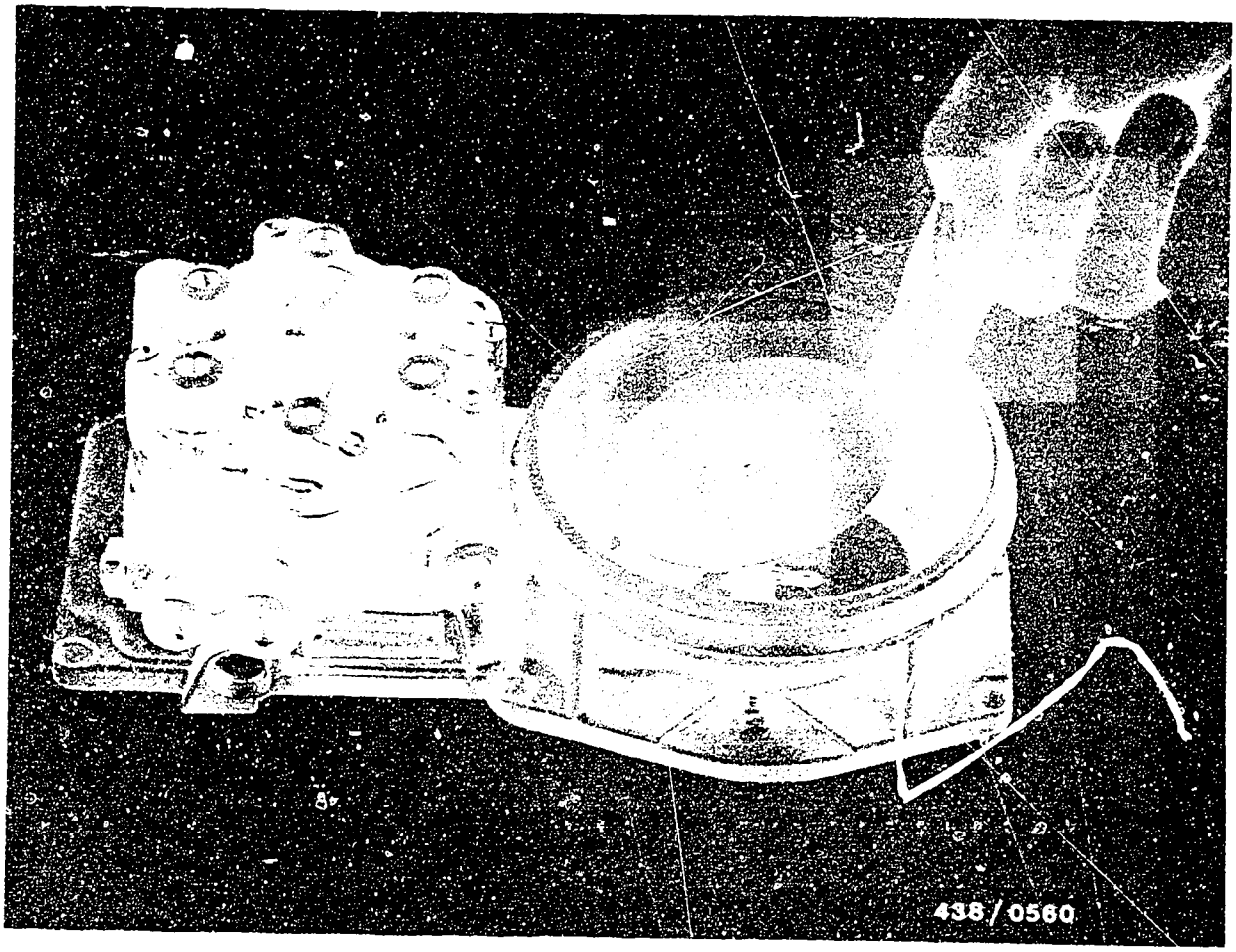
8. Check the vacuum system of the engine for leaks.

The arrows in the diagram show typical points where leaks can occur.
Check by performing a visual inspection or, in cases of doubt as follows: Disconnect the hose from the outlet of the auxiliary-air device and blow air through this hose into the intake system using a compressed-air gun. The throttle valve is to be fully open. Brush connection points with soapy water, or spray with leak detector (e.g. Güpoflex).
Under no circumstances may combustible liquids be used when testing for leaks.
The formation of bubbles or foam indicates a leak.
If a leak has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature: Idle-speed adjustment is described on Coordinates F 12.

9. Check the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

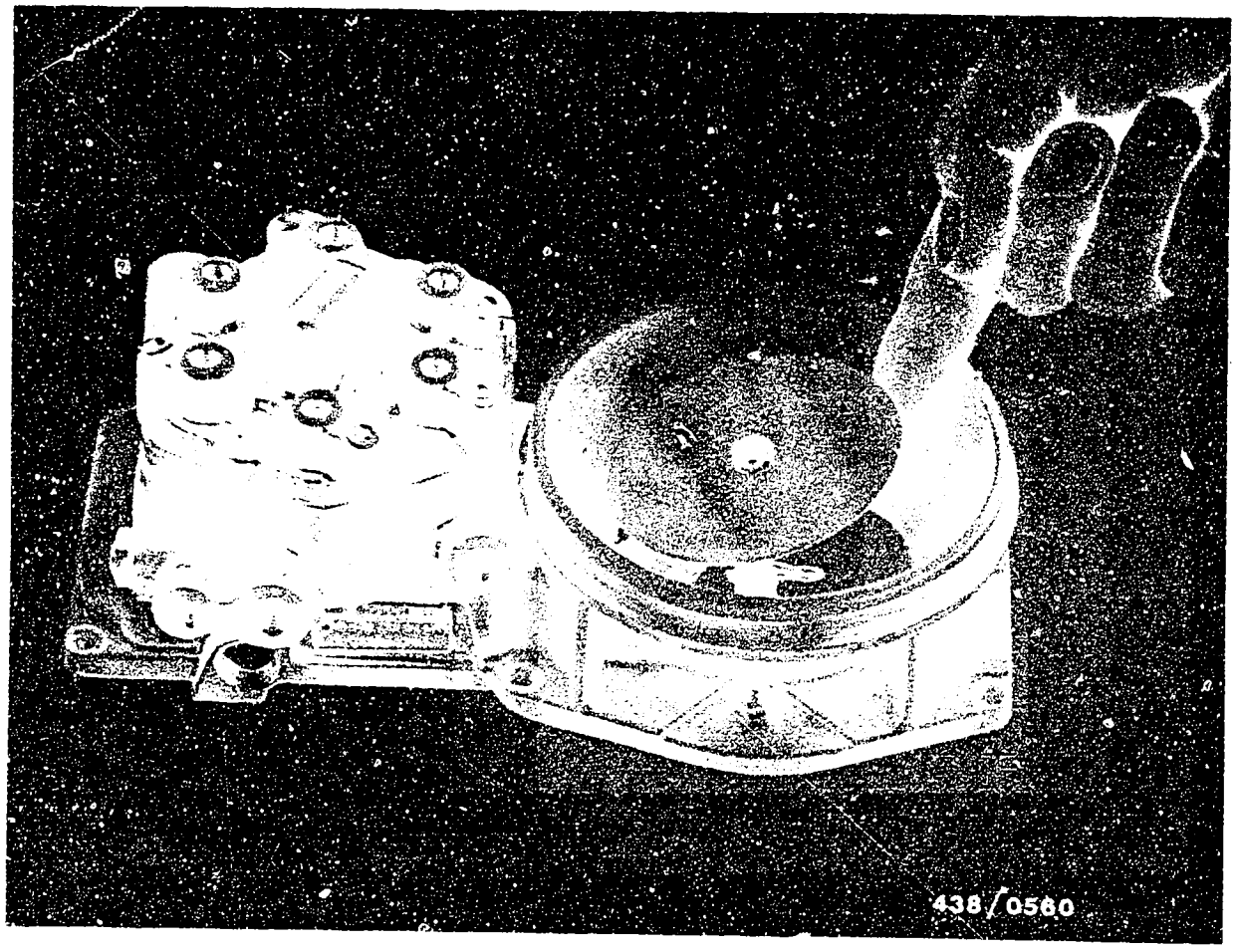
9.1 Preparations

- Engine temperature not below +20°C.
- Remove the rubber hood so that the air-flow sensor plate becomes accessible.
- Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
  This results in application of the control pressure to the control plunger in the fuel distributor.



9.2 Check that the control lever moves freely

Raise the air-flow sensor plate by hand (updraft) and release again.
The sensor plate snaps back into the zero position and bounces up about twice from the spring-loaded stop.
If the control lever does not move freely, first release all fastening screws holding the air-flow sensor to determine whether housing deformation is the cause of the problem.
If the problem is solved by loosening the fastening screws, the seal between the air-supply housing and air-flow sensor should be changed (BMW parts).
Tighten the screws uniformly cross-wise to a torque of 9...10 Nm (0.9...1.0 kgfm).
If the housing is not deformed, then the air-flow sensor must be repaired or replaced.



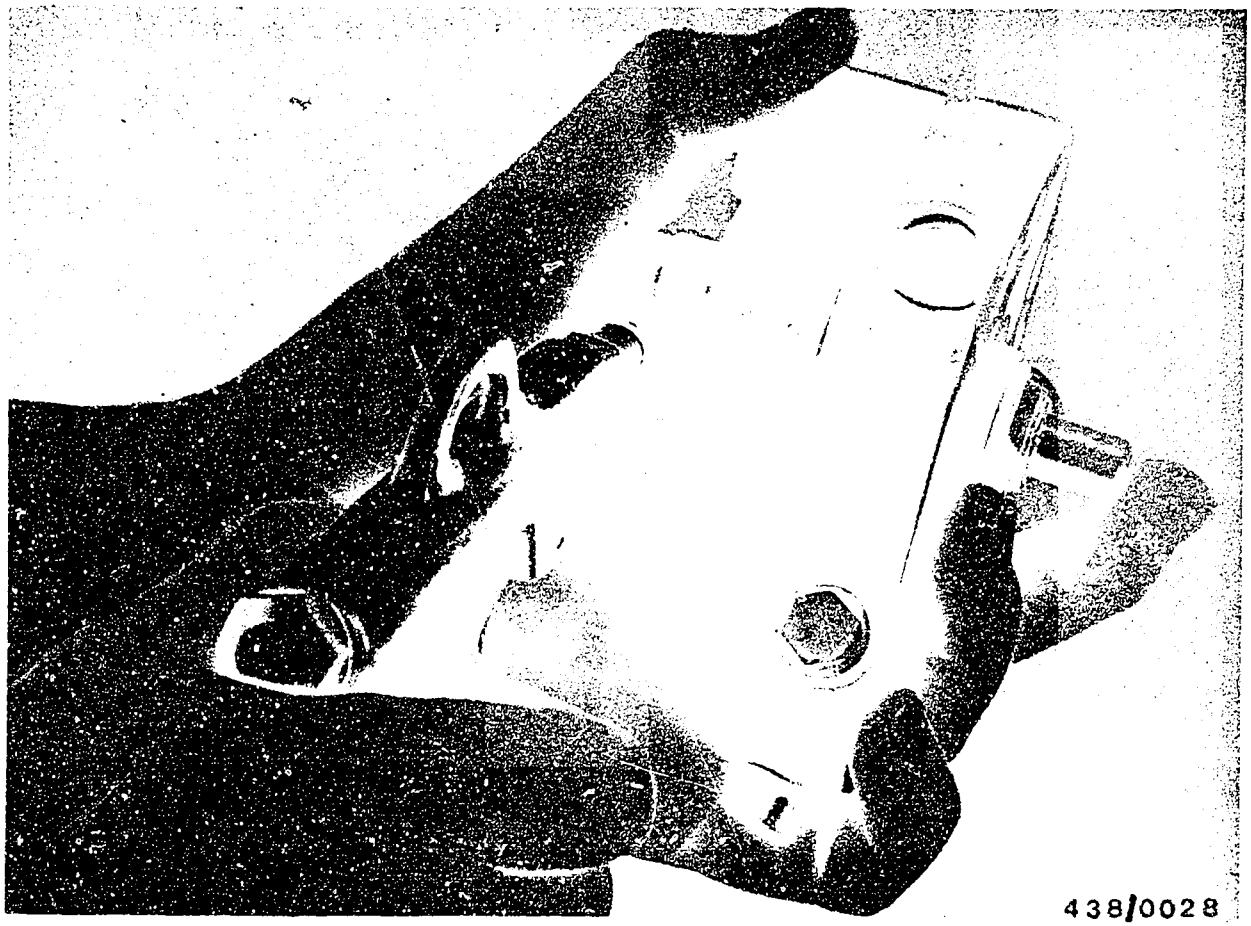
9.3 Check that the control plunger moves freely.

Raise the air-flow sensor plate by hand (updraft). The same resistance must be felt over the entire movement. Move the sensor plate rapidly back to a position just in front of the zero stop. The control plunger follows only sluggishly, but must make noticeable contact with the sensor plate lever. If this condition is fulfilled, the control plunger can be considered to move freely. If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor.

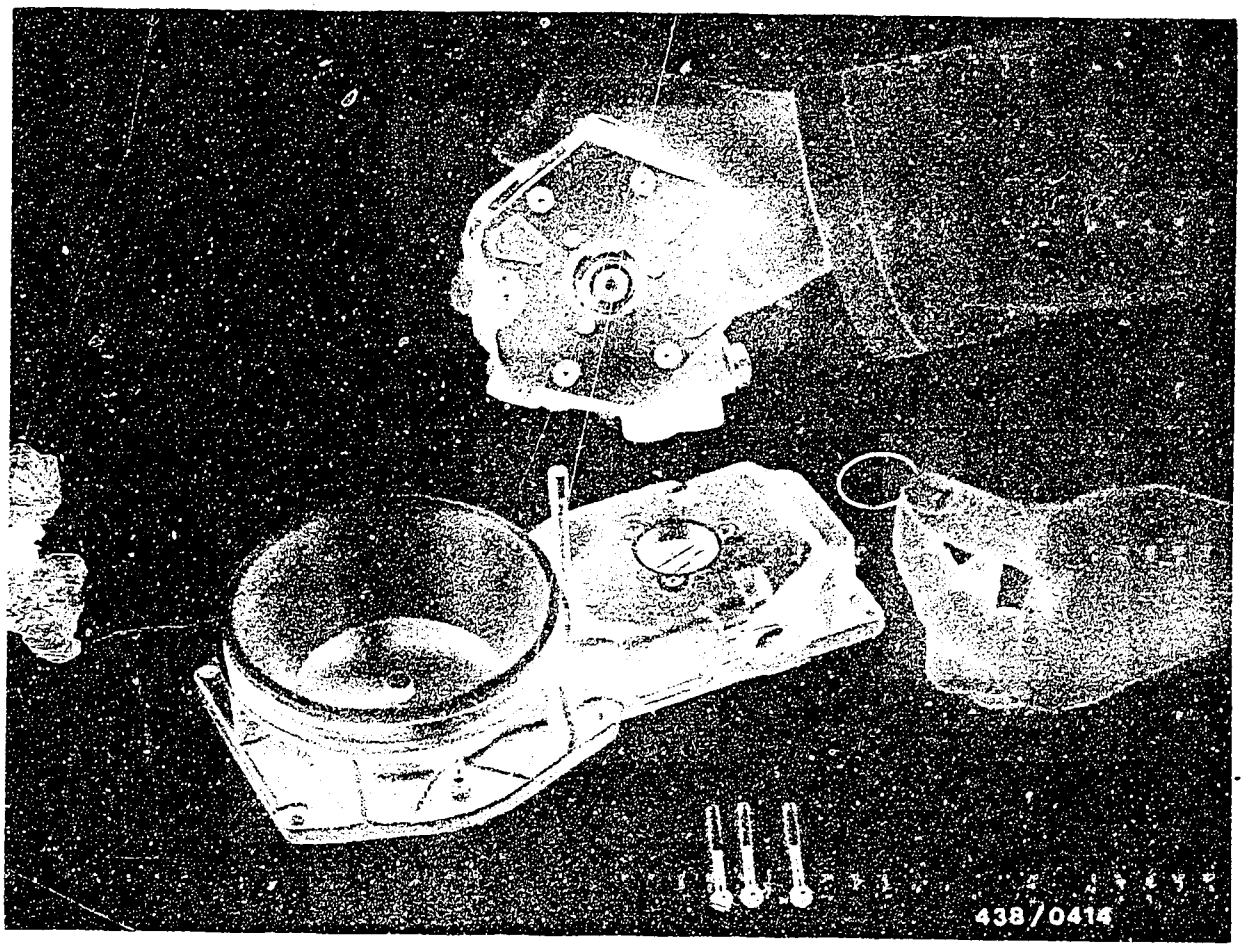
Important!
Note the following when installing fuel components and fuel lines:

Always ensure utmost cleanliness when loosening or tightening the fuel connections. No dirt must enter the fuel system.

When loosening or tightening the fuel connections, apply counter-force at the fixed hexagon of the component. Clean the fuel distributor thoroughly in the region of the fuel connections. Screw off all connections.



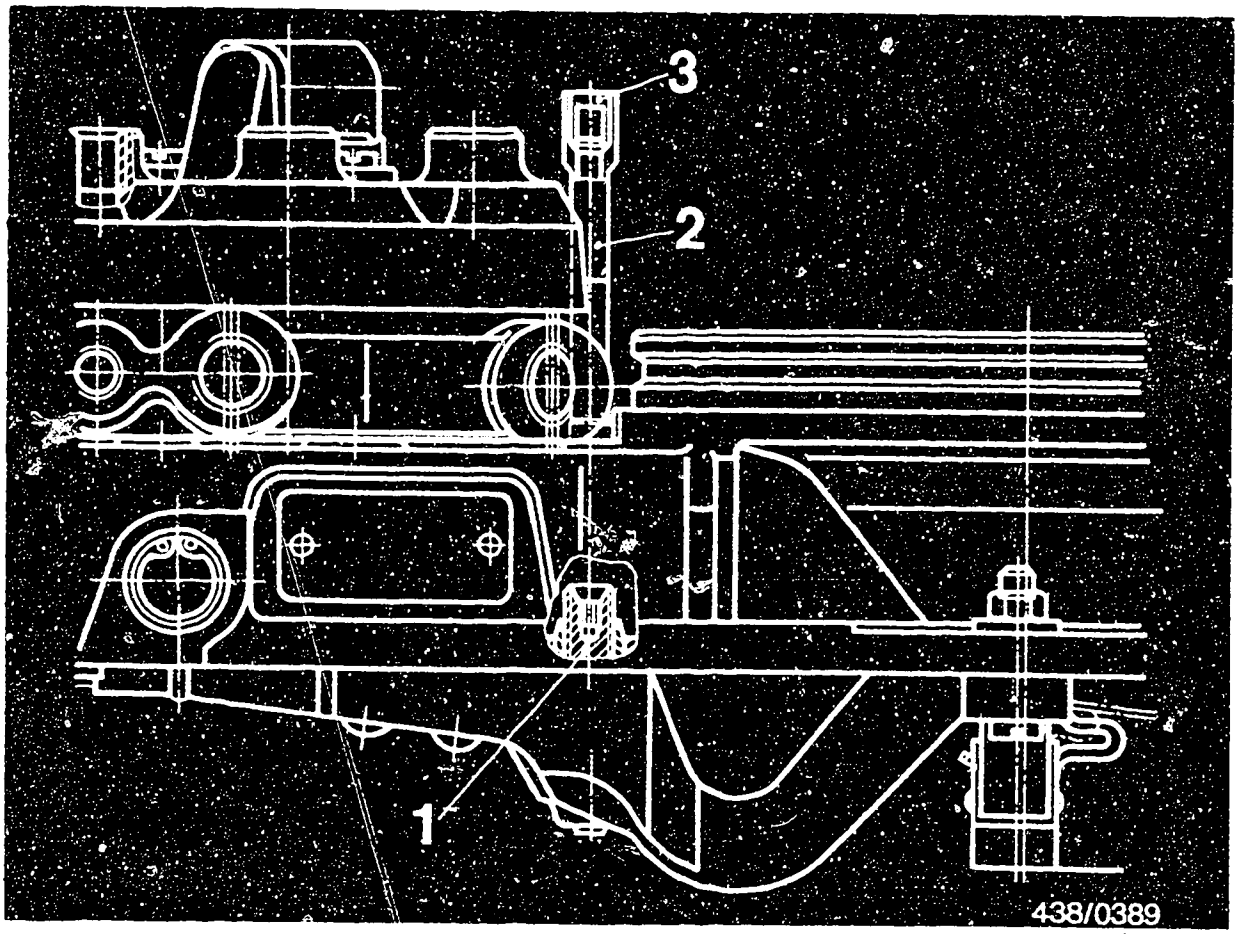
Unscrew the three fastening screws and remove the fuel distributor from the air-flow sensor.
Remove the plunger. Under certain conditions, in order to do this it may be necessary to blow compressed air briefly against the plunger through the control-pressure connection hole. Hold the plunger with your hand while doing this. Clean the plunger thoroughly with benzine. If the plunger still does not move freely, replace the fuel distributor.



9.4 Fitting the fuel distributor

When fitting the fuel distributor, use a new seal ring between fuel distributor and air-flow sensor. Observe the tightening torque 3.2...3.8 Nm (0.32... 0.38 kgfm) for the fastening screws precisely.

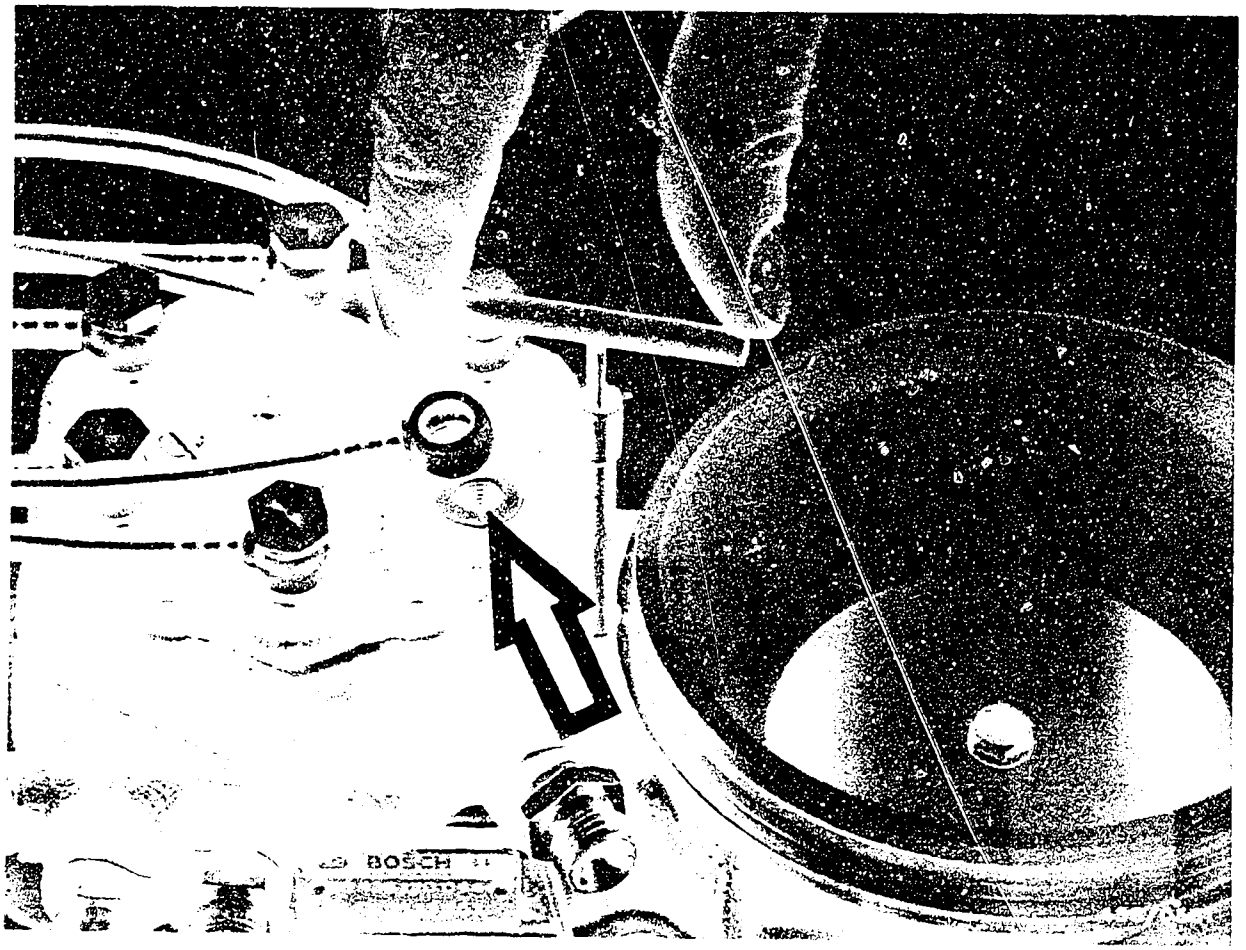
When connecting the fuel-injection tubing, use new seal rings.



1 = Idle-mixture-adjusting screw
2 = Guide tube
3 = Lead seal

9.5 Matching the fuel distributor to the air-flow sensor for initial starting

Screw off one fuel-injection line from the fuel distributor.
Bridge the electrical safety circuit so that the electric fuel pump operates.
The idle-mixture-adjusting screw is adjusted via a guide tube rigidly fitted on the mixture-control unit. Remove anti-tamper device (lead seal) of the idle-mixture-adjusting screw. Introduce adjusting wrench KDEP 1035 through the hole into the idle-mixture-adjusting screw.

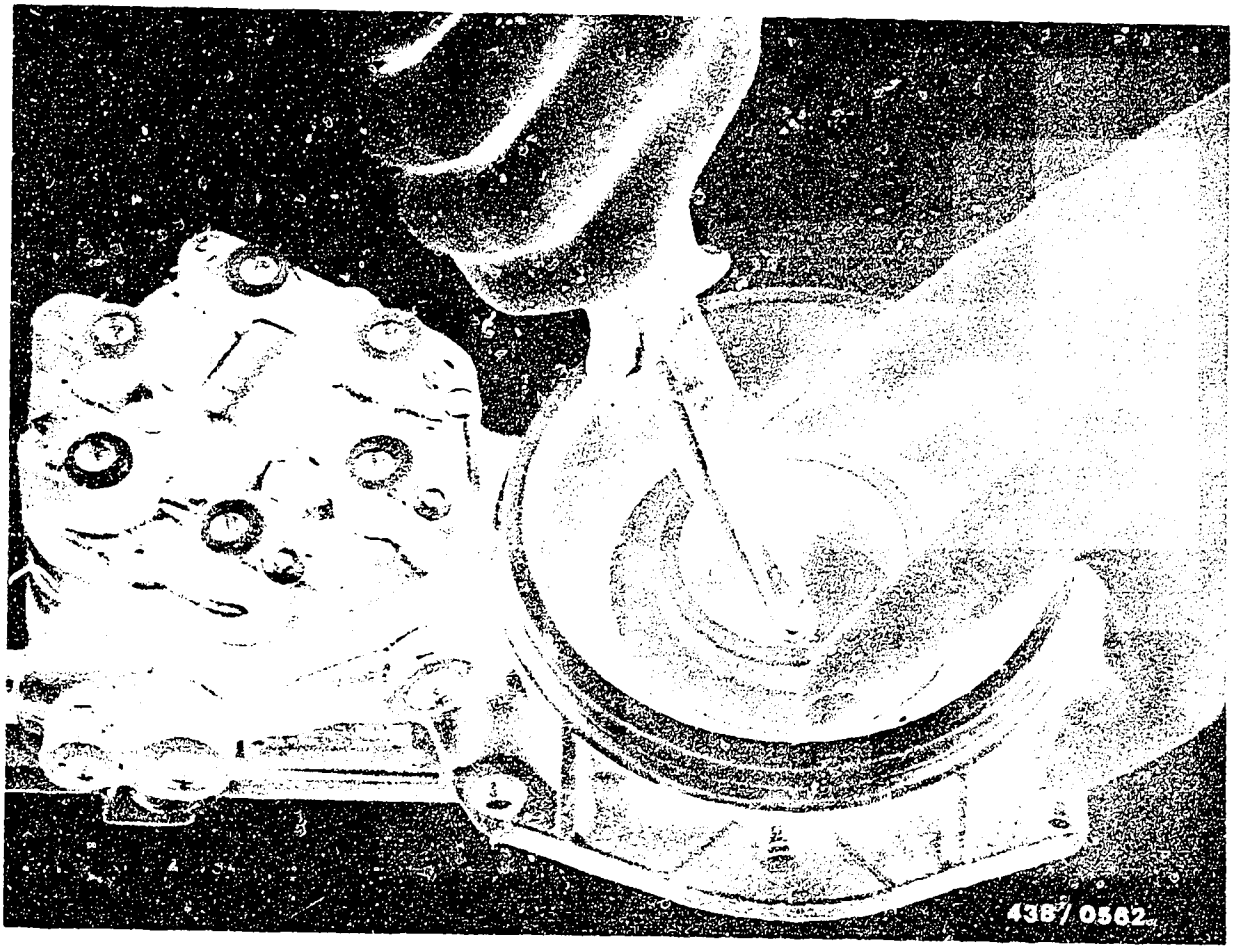


Screw in the idle-mixture-adjusting screw slowly and without exerting any great pressure on the adjusting wrench until fuel is just delivered from the open outlet (arrow) of the fuel distributor. Then turn back the adjusting screw by 1/2 turn.

Re-connect the fuel-injection line to the fuel distributor, start the engine and warm up.

The final matching of air-flow sensor and fuel distributor is carried out by adjusting the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 12.



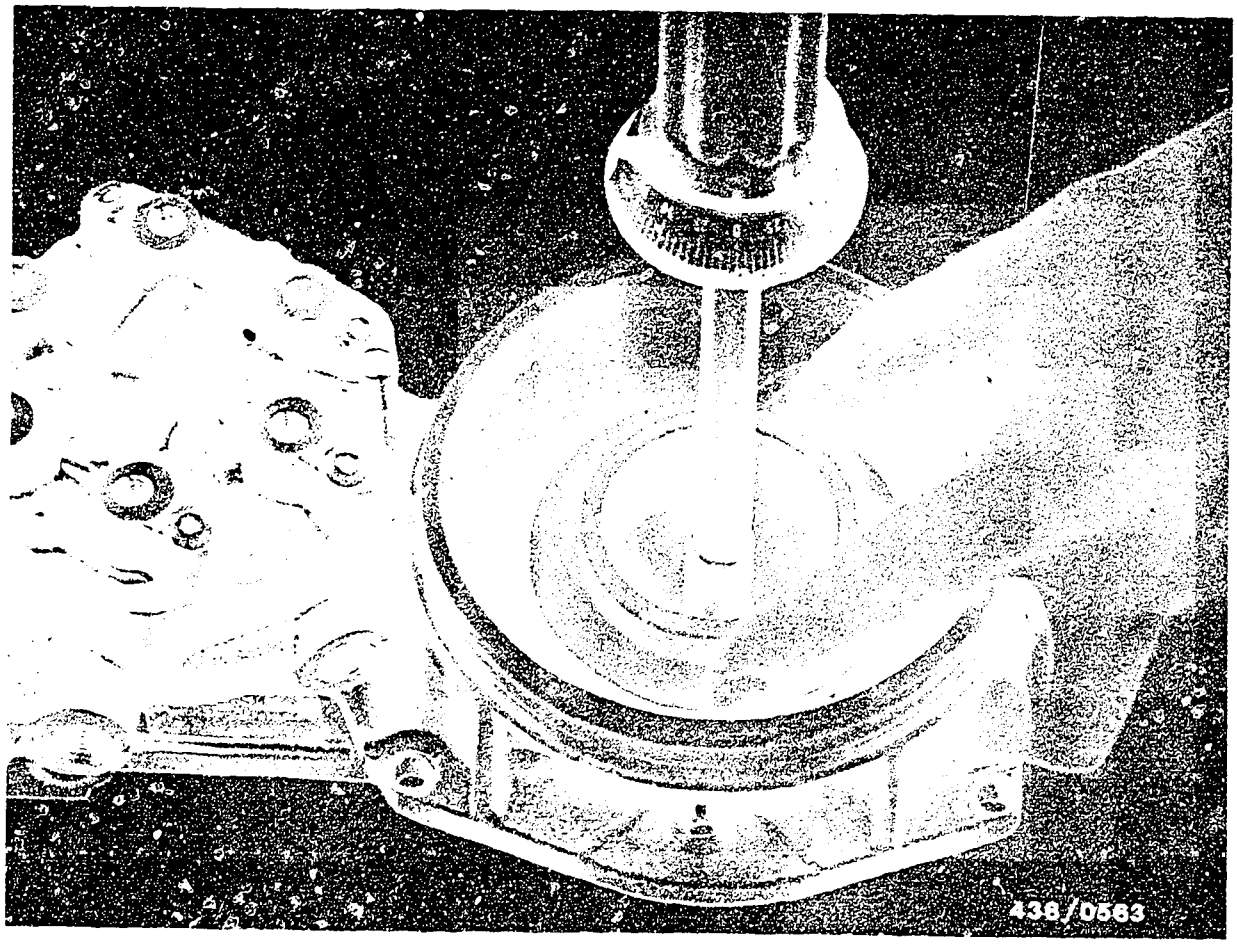
10. Checking and adjusting the position of the air-flow sensor plate

10.1 Preparations

- Engine temperature is not important.
- Remove the rubber hood from the air-flow sensor (release 2 clamping bands), so that the air-flow sensor plate becomes accessible.

10.2 Centering the air-flow sensor plate

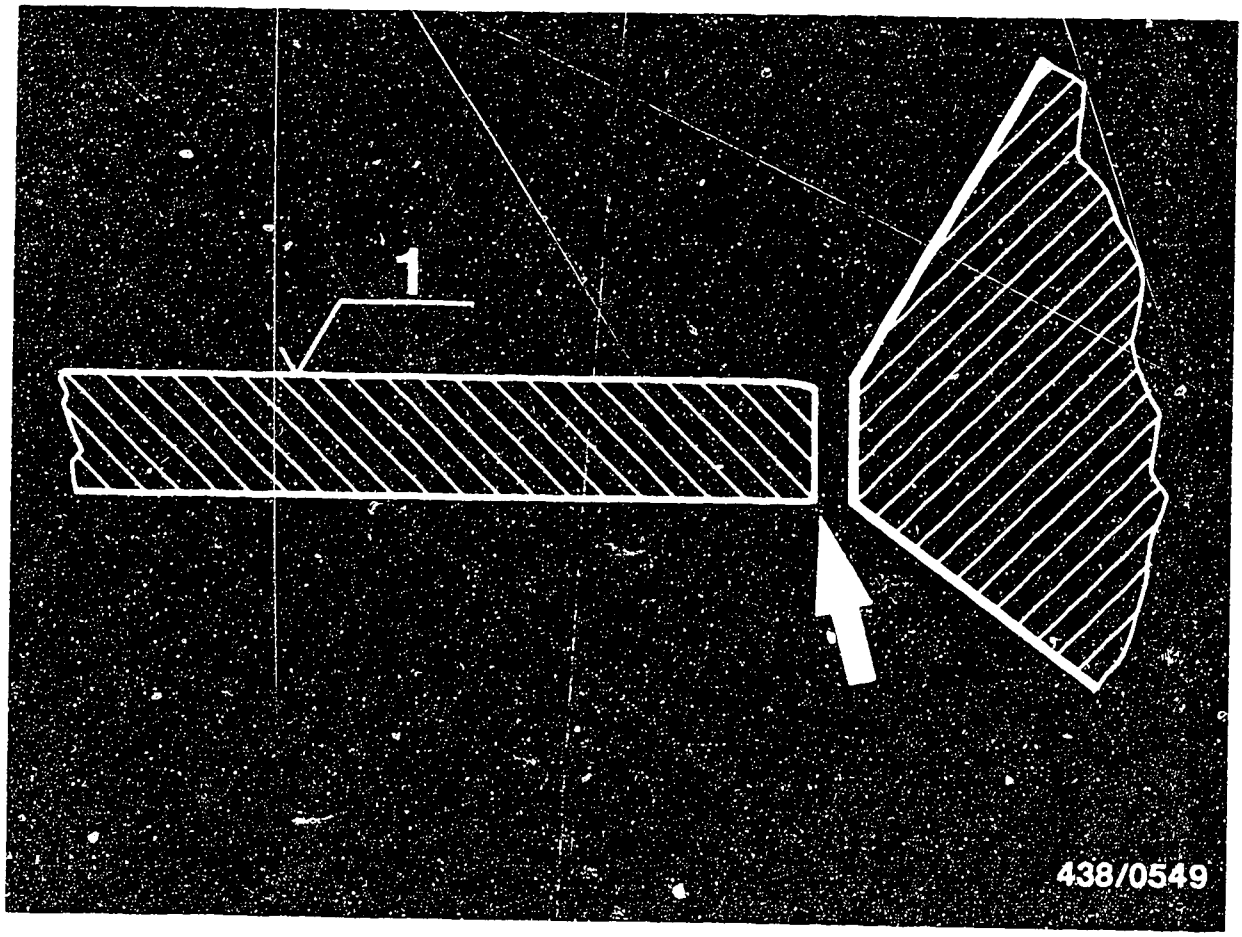
Check that the sensor plate is flat (not bent) and that it can move through the narrowest part of the air funnel without touching the funnel. If necessary, center it using a positioning ring KDEP 1040/10 (dia. 80 mm) as follows:



Loosen the sensor plate fastening screw. Insert the positioning ring while holding the fastening screws with pliers so that the sensor plate does not deflect downwards.

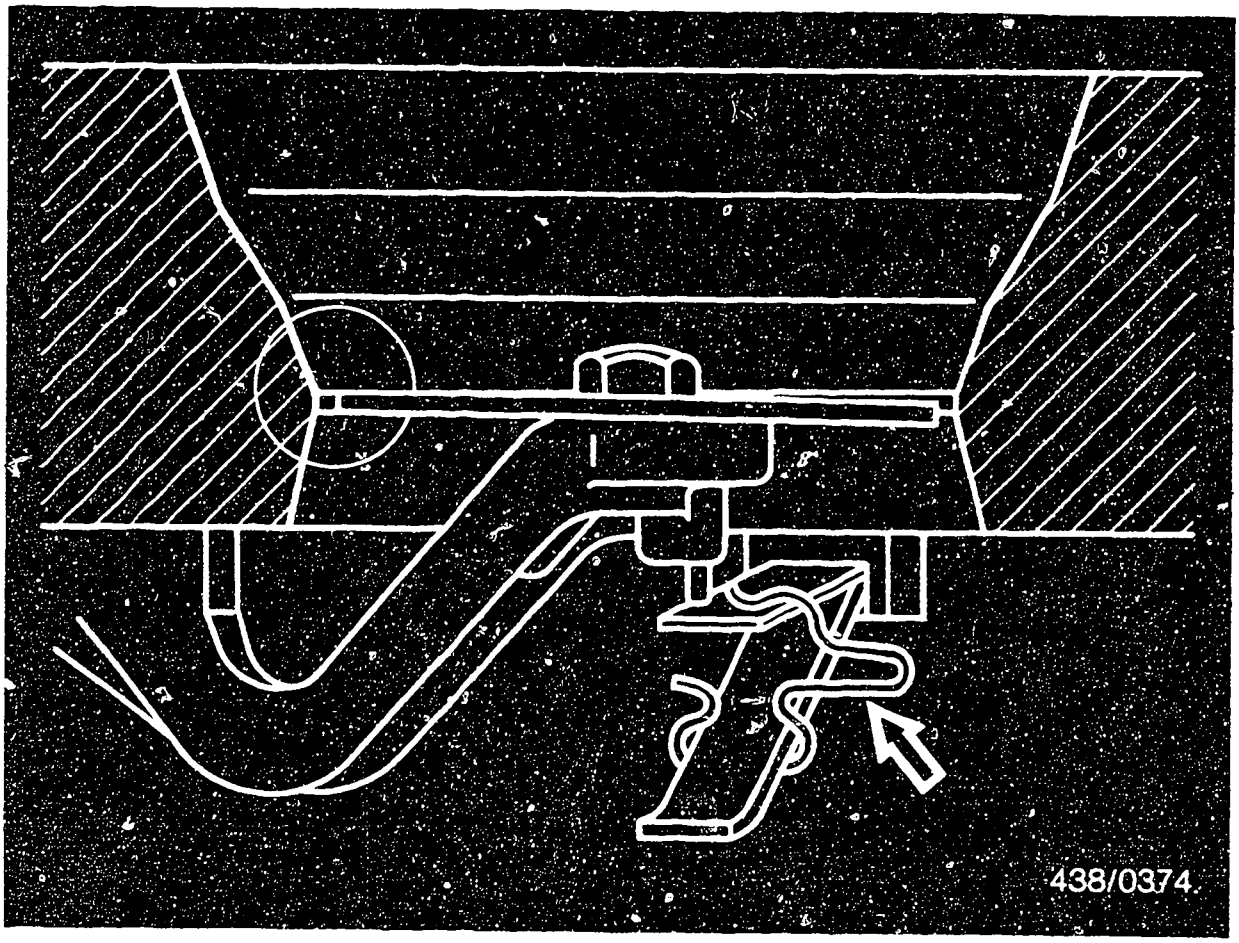
With the positioning ring in place, tighten the fastening screw with a torque of 5.0...5.5 Nm, loosen again and tighten again with the same torque.

When tightening the screw make sure that the air-flow sensor plate is in its zero position (in the cylindrical part of the air funnel).
It must no longer be possible to turn the air-flow sensor plate by hand.



1 = 5 centre-punch marks

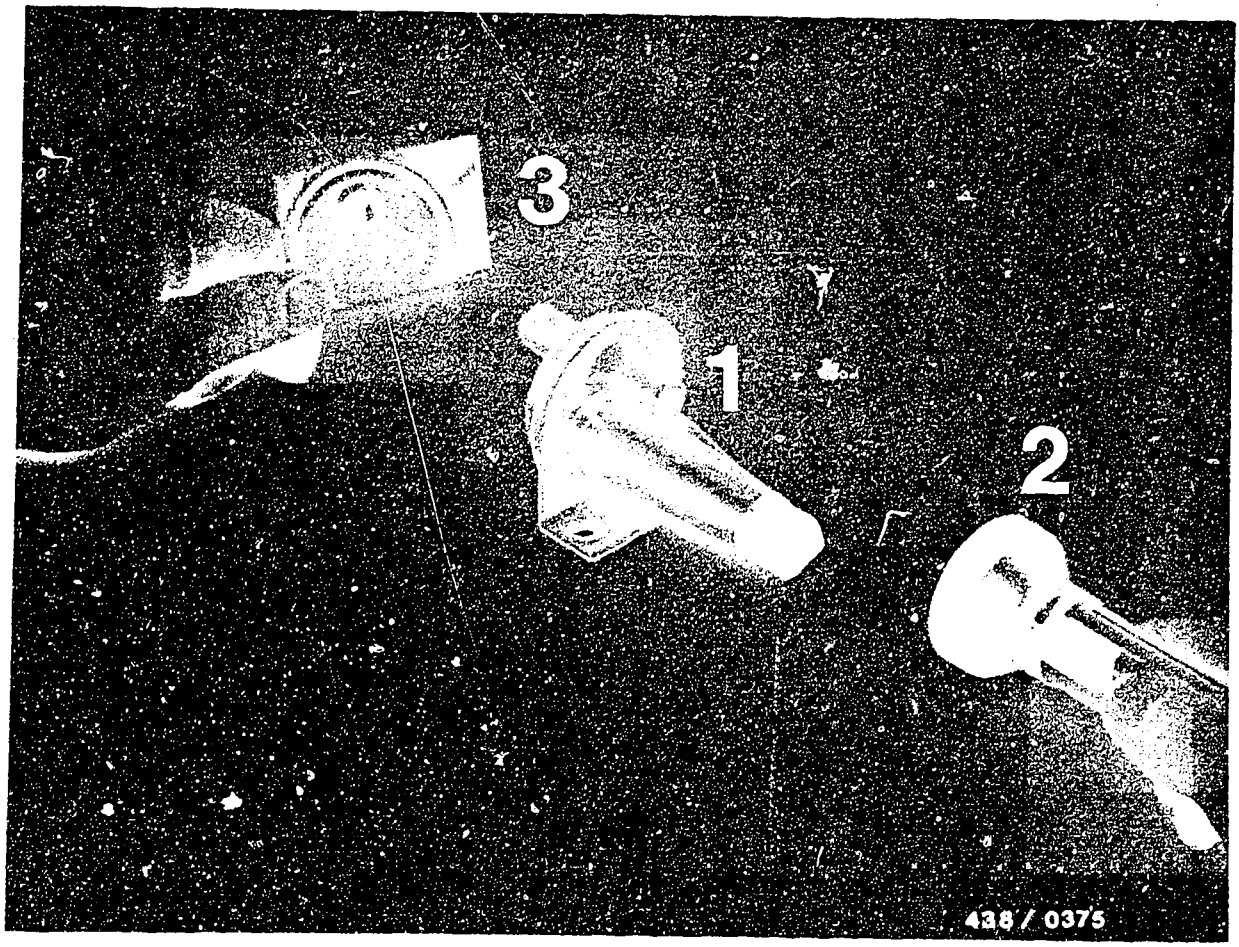
Caution:
Ensure that the air-flow sensor plate is correctly installed.
The top side of the air-flow sensor plate is identified by five centre-punch marks (in a line).
The sharp edge (arrow) of the air-flow sensor plate is at the bottom.



10.3 Checking and adjusting the zero position of the sensor plate (rest position):

Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
This results in application of the control pressure to the control plunger in the fuel distributor.

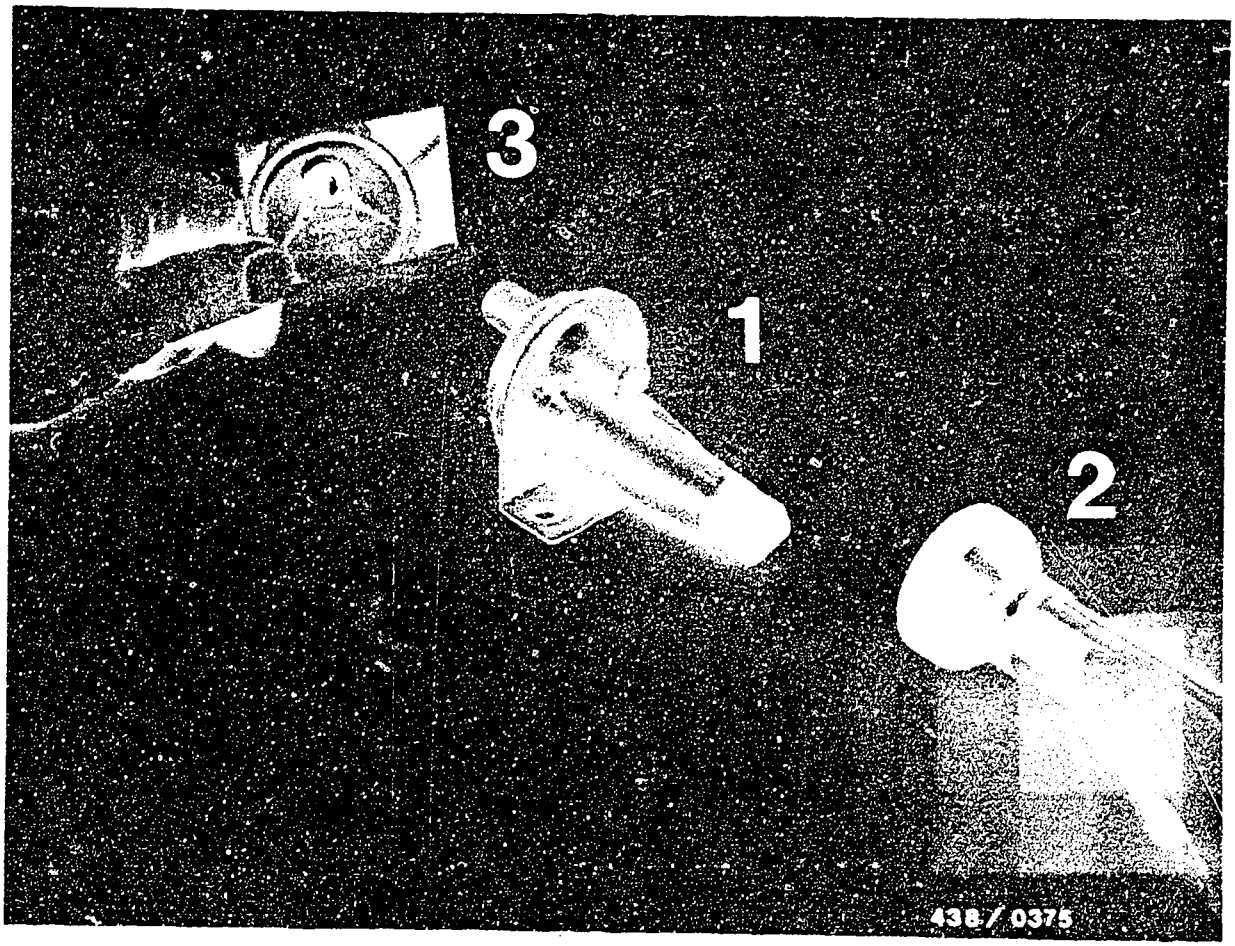
The upper edge of the sensor plate must be flush with the beginning of the cone in the position shown in the picture. A lower position of up to maximum 0.5 mm is permissible, however the air-flow sensor plate must not project at any point on its circumference outside the cylindrical part of the air funnel.
If necessary, the position of the leaf-spring limit-stop can be corrected by adjusting the shaped spring (arrow).



1 = Auxiliary-air device
2 = Flashlight
3 = Mirror

11. Checking the operation of the auxiliary-air device.

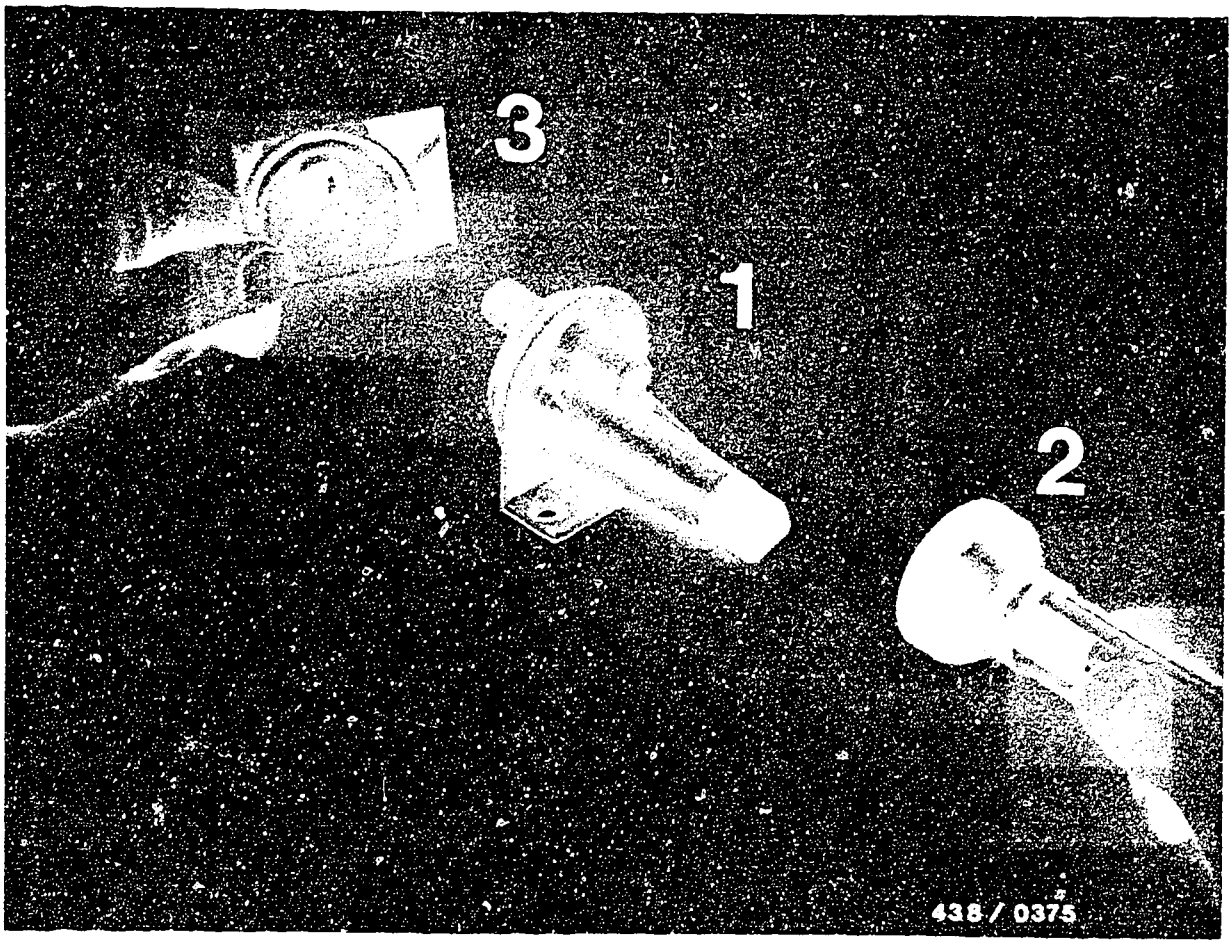
The engine must be cold.
Disconnect the electric cable plugs from the auxiliary-air device and warm-up regulator.
Disconnect both air hoses from the auxiliary-air device.
Since the two hose fittings on the auxiliary-air device are located exactly opposite each other, a visual check can now be made to see if the blocking plate is partially open.



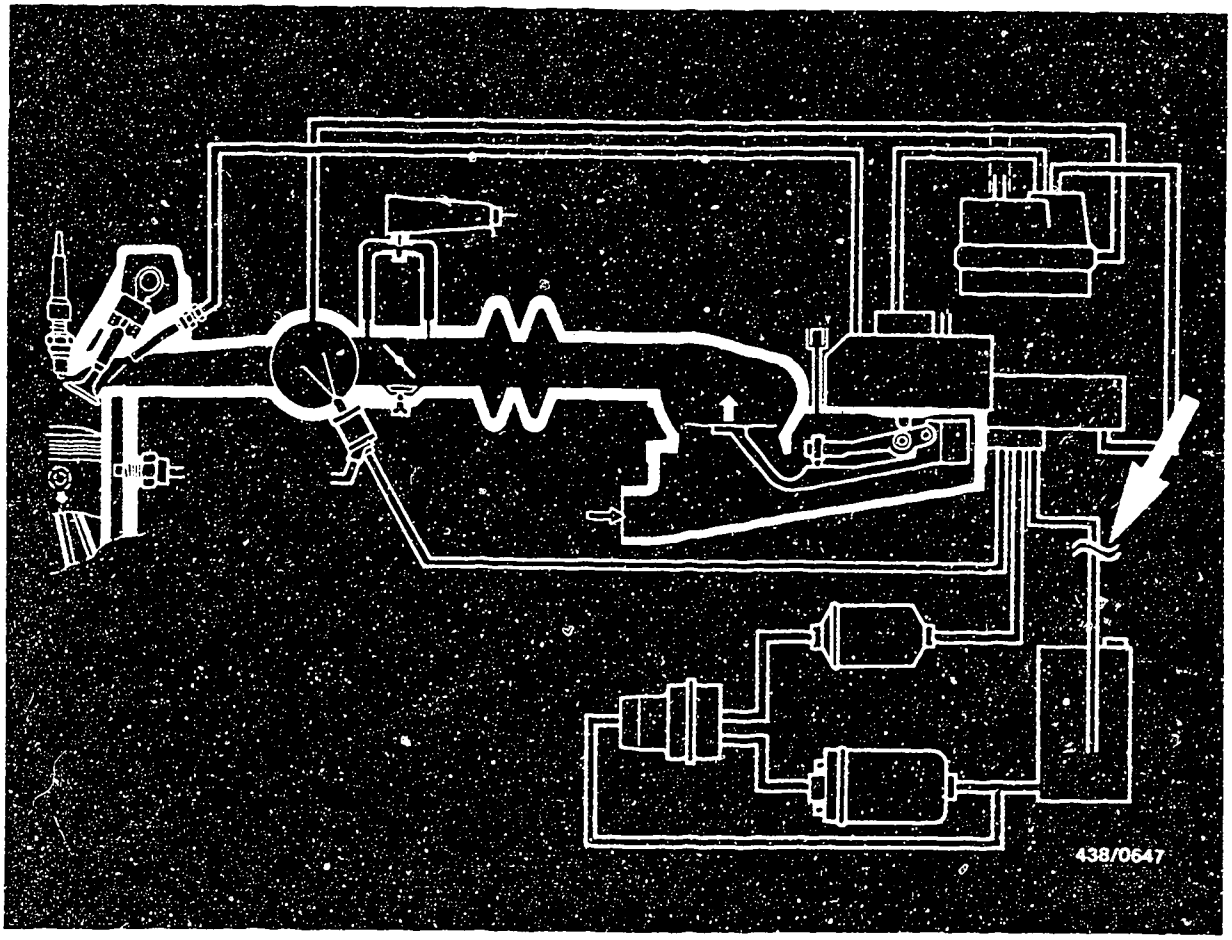
It will be easier to look through the auxiliary-air device with the aid of a flashlight and a mirror, as shown in the illustration.

If an opening is not visible with the engine cold, replace the auxiliary-air device.
Fit the electric cable plug on the auxiliary-air device.
By bridging the electrical safety circuit, supply power to the auxiliary-air device.

After a maximum of 10 minutes, the opening in the auxiliary-air device must be completely closed by the blocking plate.
If the blocking plate does not close, check the power supply (open circuit, voltage drop).
The minimum voltage at the connector is 11.5 V with the engine switched off.



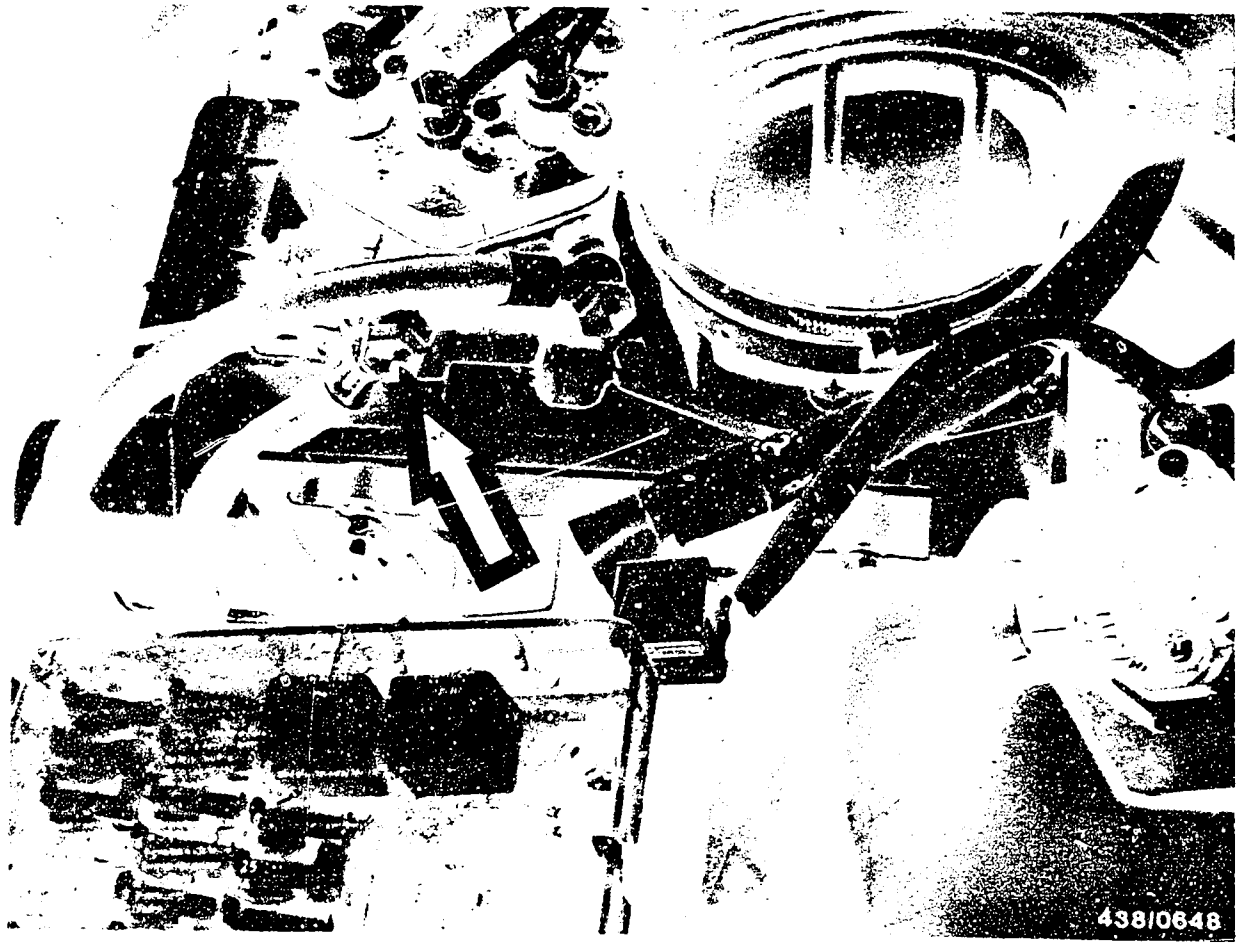
If these points are O.K., check for an open circuit in the heating coil of the auxiliary-air device using an ohmmeter.
Replace the auxiliary-air device if defective.
The water-heated auxiliary-air device (not made by Bosch) fitted as of the 1982 model is tested in the same way.



12. Checking the operation of the electric fuel pump.

12.1 Requirement

Conclusive information on the operation of the electric fuel pump can only be given by a measurement of fuel delivery under pressure, i.e. under primary (system) pressure. This measurement must therefore be made at the return line leading to the fuel tank (arrow).



12.2 Measuring point

A suitable measuring point for fuel-delivery testing is the return port (arrow) on the fuel distributor.
Unscrew the fuel return line from the fuel distributor.
Equip a test hose (minimum inside diameter 8 mm) with an inlet union and union nut M 12 x 1.5 and connect to the return port of the fuel distributor.
Hold the end of the hose in a graduate (approx. 1.5 litre capacity) in order to make the measurement.

12.3 Checking:

Pull off the plug from the warm-up regulator and auxiliary-air device. Switch on the electric fuel pump for 30 seconds by bridging the safety circuit and collect the fuel delivered in a graduate.

12.4 Test specification:

Fuel delivery: at least 850 cm^3/30 seconds.

12.5 Possible causes of insufficient fuel delivery:

- Power supply to the electric fuel pump defective, voltage drop. Minimum voltage at terminal with pump operating = 11.5 V.

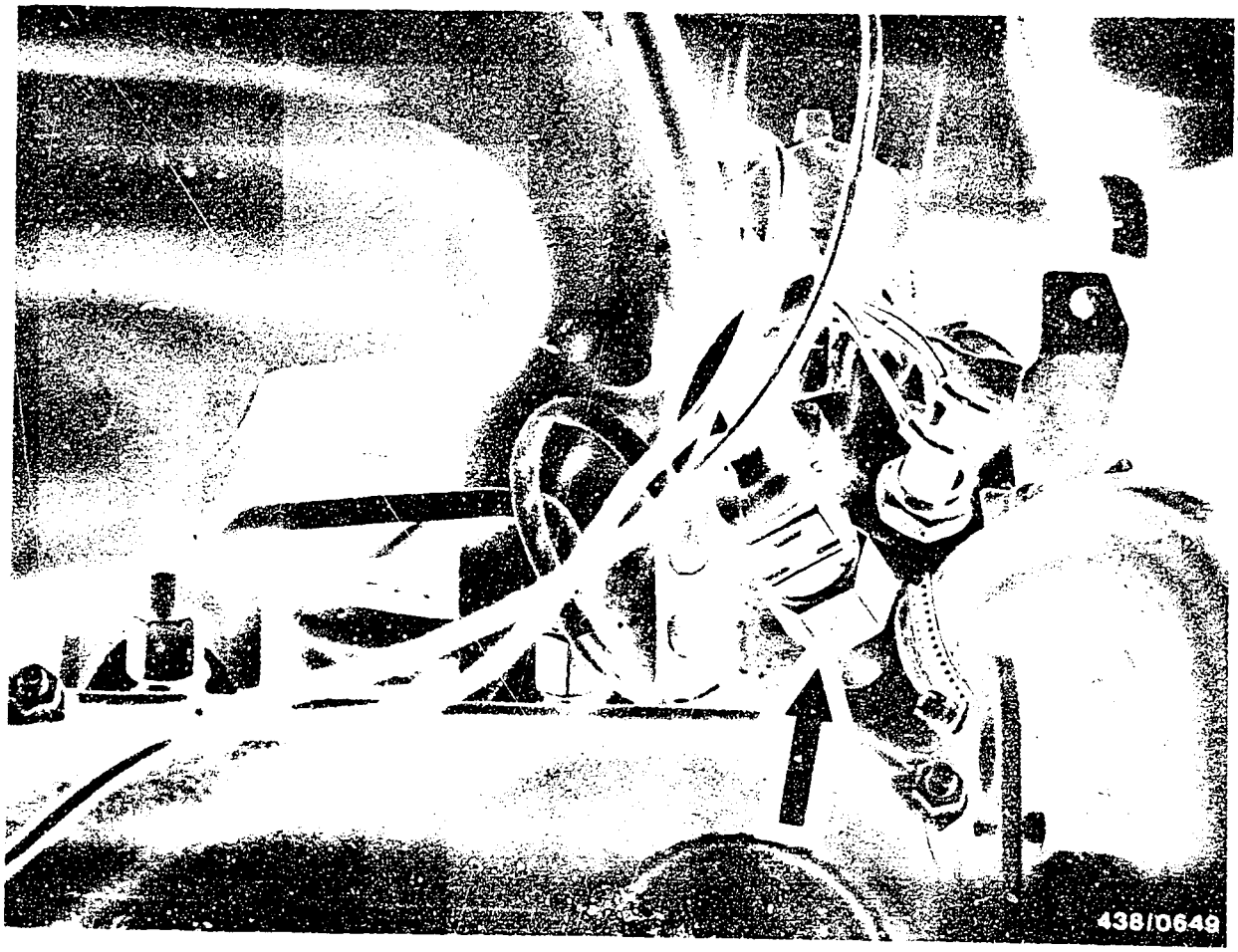
- Fuel filter very dirty.

If these points are O.K., the fault lies in the electric fuel pump itself.
Replace the electric fuel pump.

12.6 Removal and installation of the electric fuel pump:

Pinch off the fuel intake hose from the fuel tank to the electric fuel pump (e.g. using hose clamper W 157 from Matra Co.).

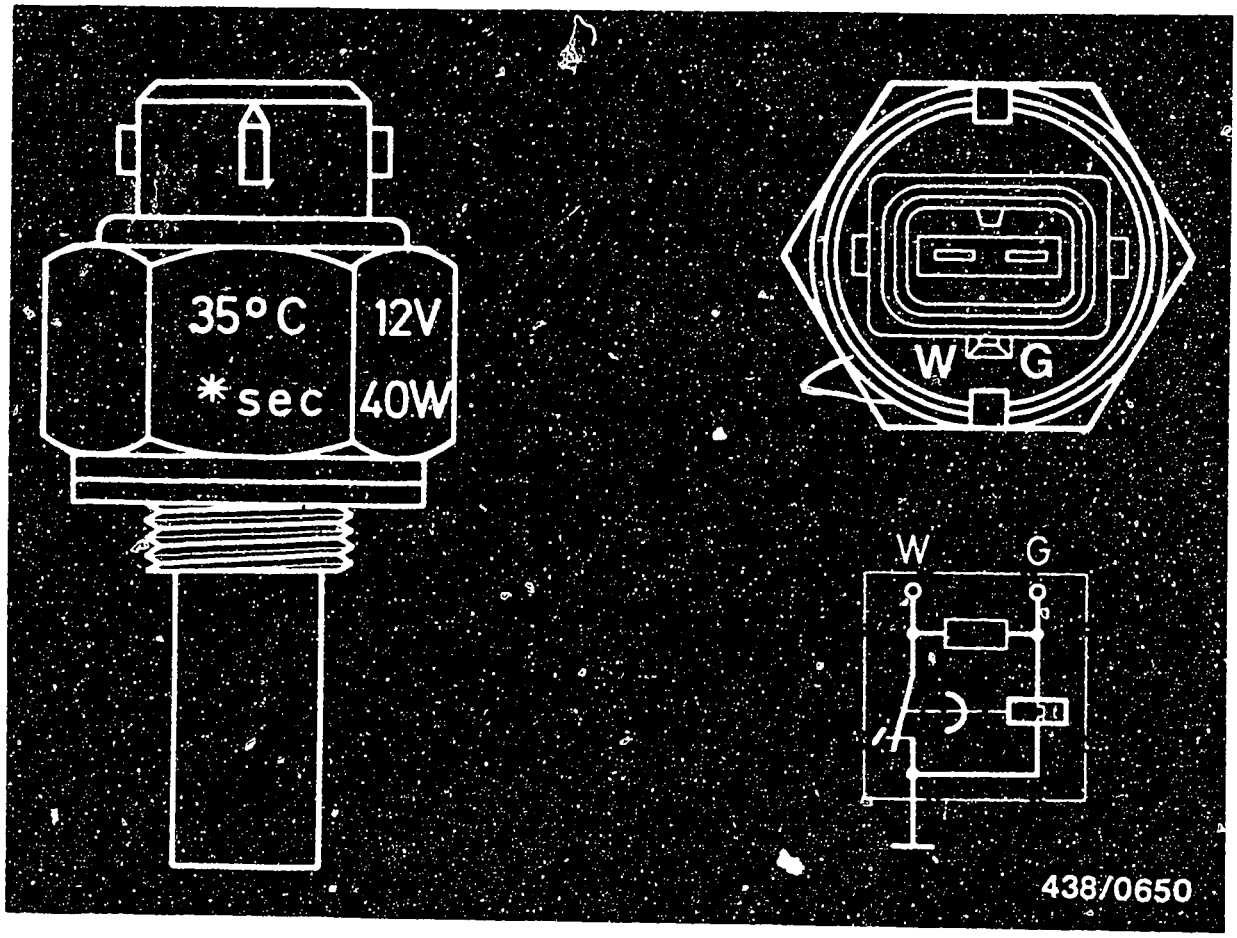
When installing, use a new seal and pay attention to the correct positioning of the electric fuel pump. Danger of bending the fuel lines.



13. Checking the cold-start system (thermo-time switch, cold-start valve).

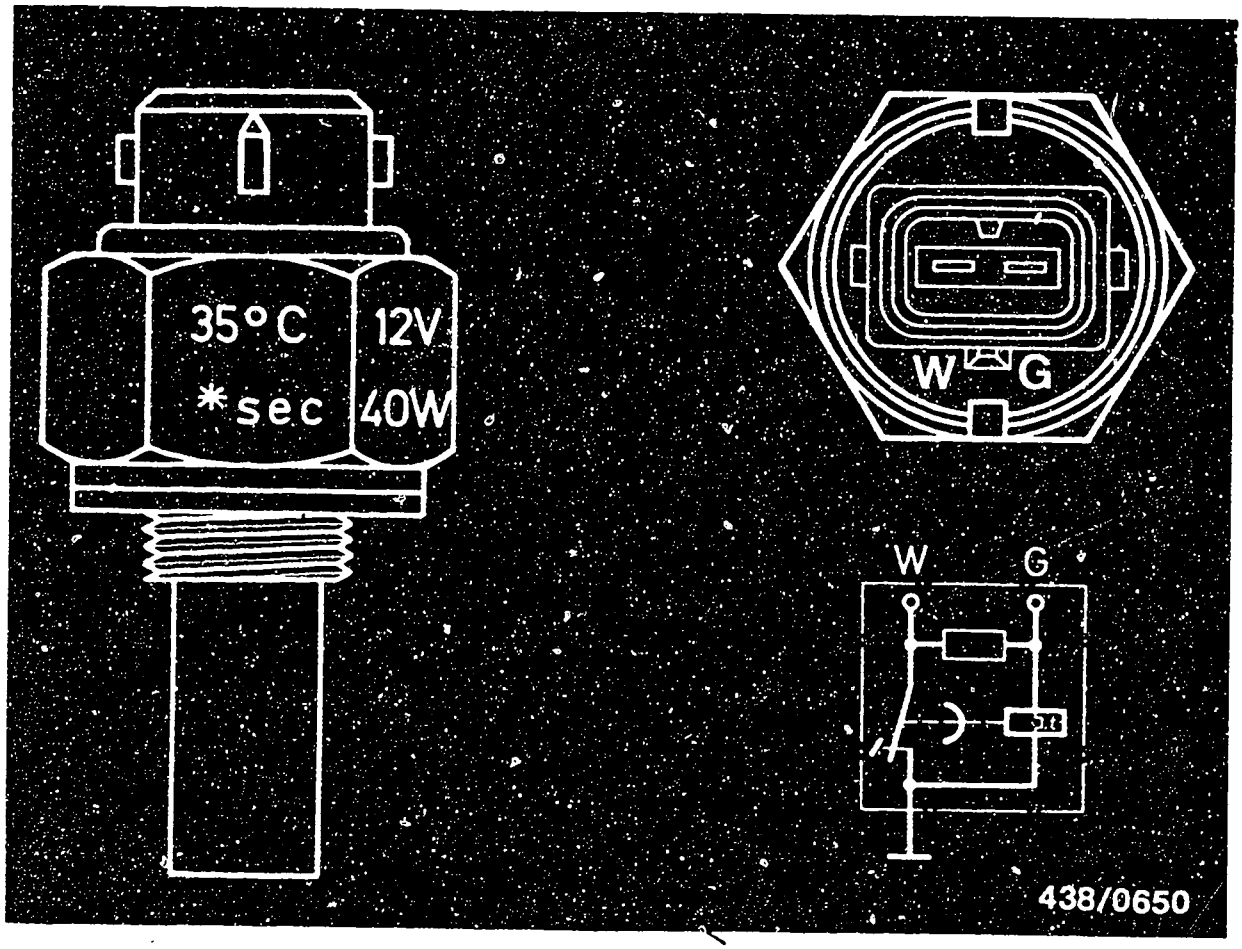
13.1 Thermo-time switch

Remove the thermo-time switch (arrow) for testing. It is to be found on the forward end face of the cylinder head in the cooling-water distribution fitting.
Collect any escaping coolant in a container.



*Thermo-time switch No. 0 280 130 214 = 8 sec.
Thermo-time switch No. 0 280 130 220 = 12 sec.

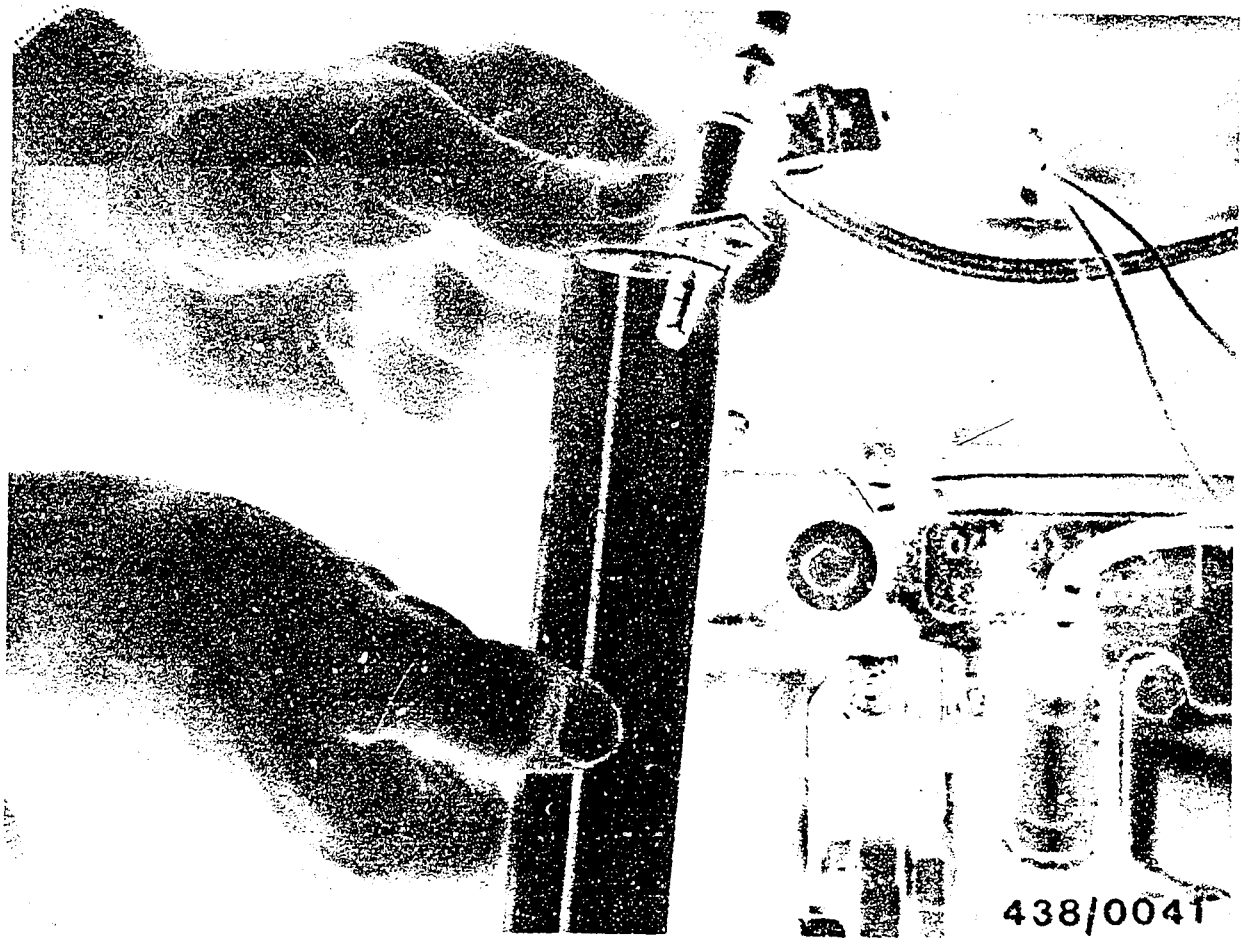
The switching temperature 35°C and the switching time at -20°C of * seconds are stamped into the hexagonal section of the thermo-time switch.
The removed thermo-time switch is tested using the ohmmeter in accordance with the specifications given below. The temperatures for the thermo-time switch can easily be obtained with water. Cooling takes place in a freezer chest.



+Thermo-time switch No. 0 280 130 214 = 8 sec.
Thermo-time switch No. 0 280 130 220 = 12 sec.

Resistance measurement (Ω) between

Part No.	At a temp. below °C	At a temp. above °C	Term."G" and "ground" (housing)	Term."W" and "ground" (housing)	Term."G" and "W"
0 280 130 214	+30	+40	25...40 50...80	0 100...160	25...40 50...80
0 280 130 220	+30	+40	40...60 50...70	0 240...300	40...60 180..240



13.2 Cold-start valve

Remove the cold-start valve. Hose line remains connected. Pull off the plug and connect the start valve directly to ground and to terminal 15 (e.g. at the ignition coil) using connecting cable KDJE 7450/70.

Important note:

During this test, do not let the connecting cable touch B+.

Danger of fire due to sparking!

Hold the start valve in a suitable container (e.g. the graduate).

Switch on the electric fuel pump by bridging the safety circuit.

Switch on the ignition (max. 30 seconds). The start valve must now open and spray fuel.

Switch off the ignition. Remove the electric connecting cable and dry the nozzle of the start valve.
The safety circuit remains bridged so that the primary pressure is applied to the start valve.

No droplets of fuel must drip from the nozzle of the start valve during the next minute. Even if shaken and knocked, the start valve must not leak.
Then switch the electric fuel pump off again. Replace the start valve if it does not open or if it leaks.

13.3 Thermo-switch, Model 520i only

The thermo-switch (not made by Bosch) is tested with a test lamp or ohmmeter.

At temperatures above +5°C the contact must be open.
At temperatures below -8°C it must be closed.

Replace the thermo-switch if defective.

When a leaky start valve or a defective thermo-time switch has been replaced, carry out the idle adjustment with the engine at normal operating temperature.
Idle adjustment is described on Coordinate F 12.

14. Checking the control pressures

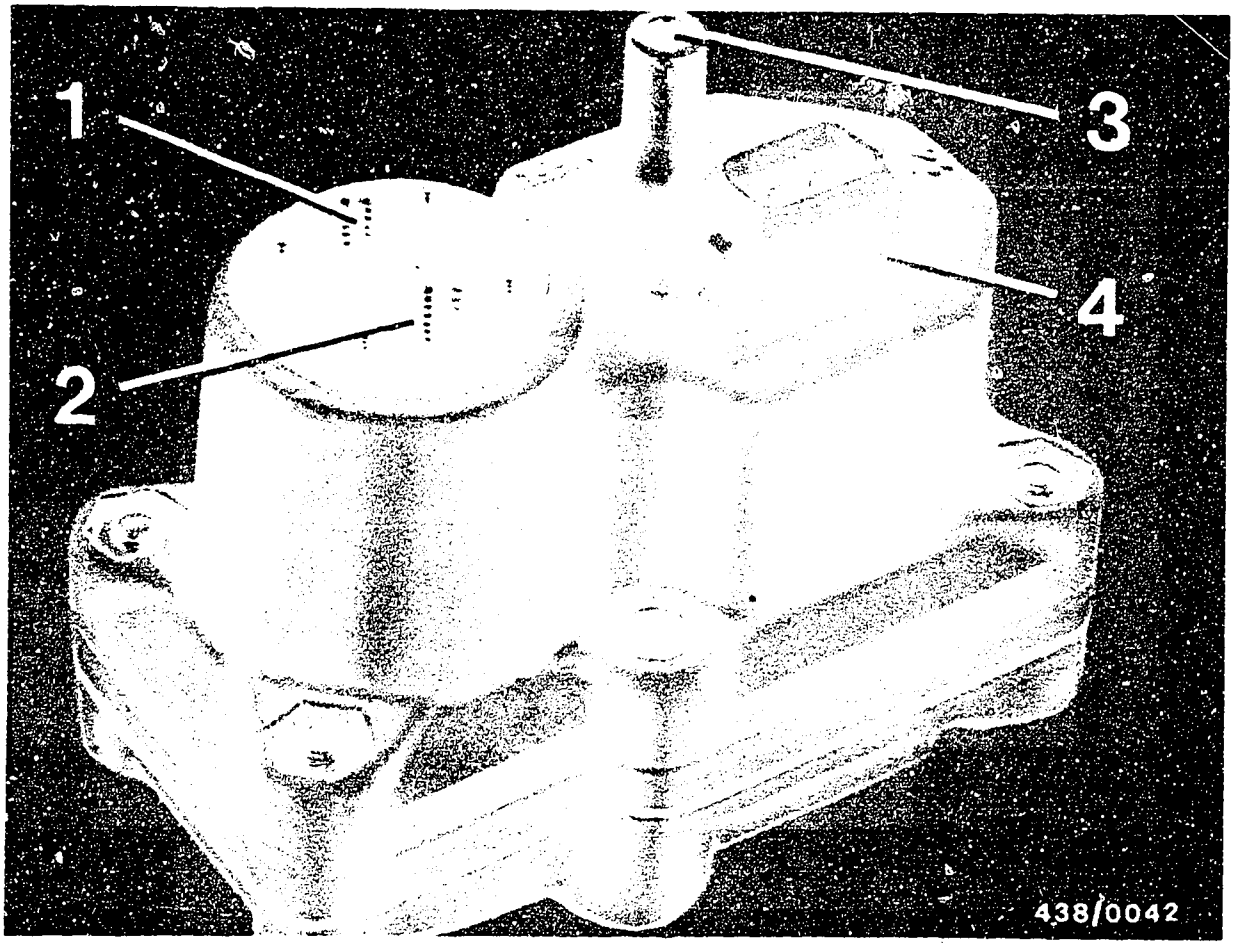
14.1 Preliminary remarks:

The control pressures tested in the following are in each case governed by the warm-up regulator.
If the test results are incorrect, however, this may also be due to faults which have nothing to do with the warm-up regulator.

These possible faults are:

- No or too low a voltage at the electric connector.
- Fuel return from the warm-up regulator blocked or constricted.
- Too high a fuel delivery for the control-pressure circuit.
  The testing of this control-pressure delivery is described as an additional test step at the beginning of the control pressure tests.

Reference is made to the other possible causes of trouble in the respective test step.

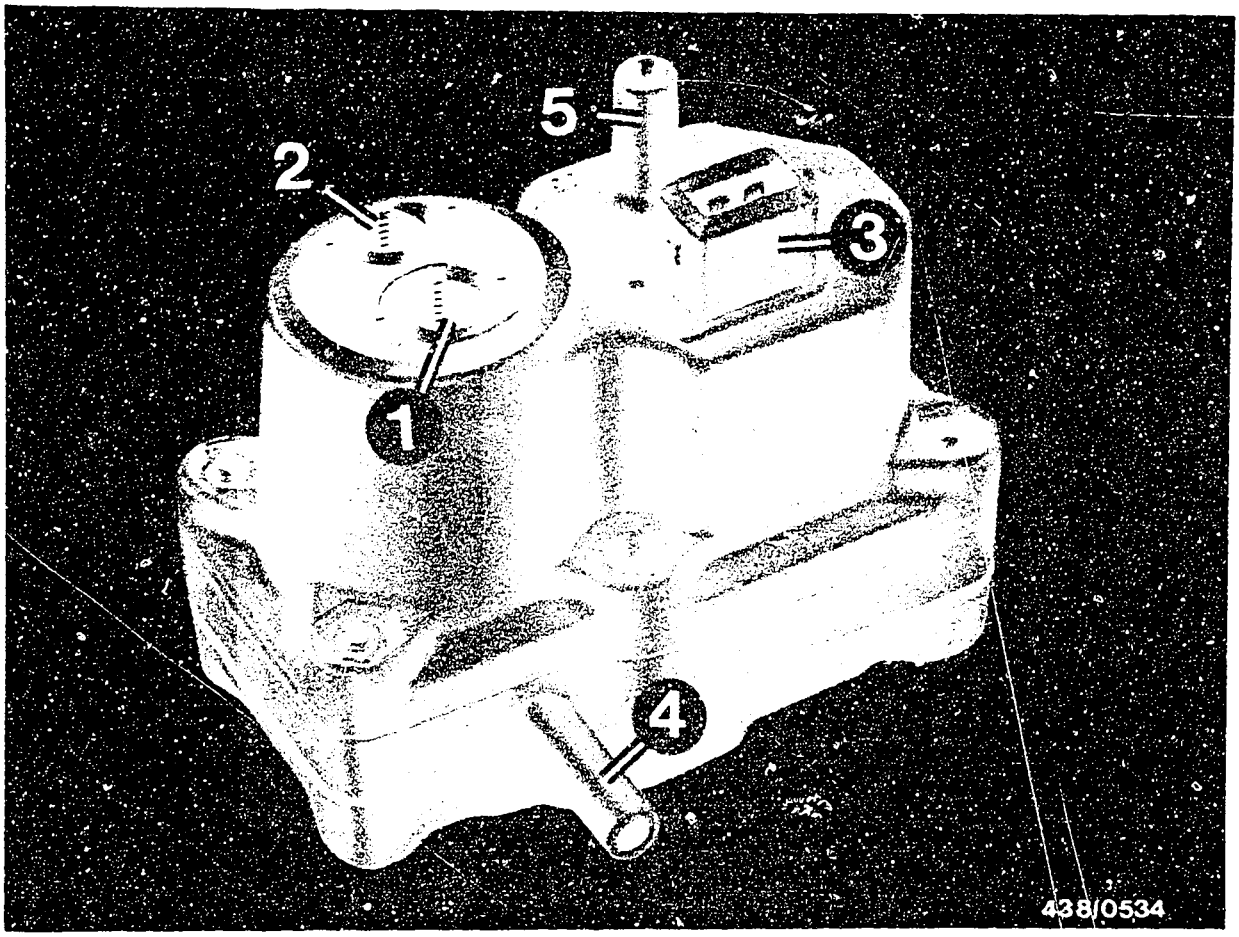


1 = Return connection (M 8 x 1)
2 = Inlet connection (M 10 x 1)
3 = Connection for intake-manifold pressure (downstream of throttle valve)
4 = Electric connection

14.2 Warm-up regulator versions

• Warm-up regulator No. 0 438 140 005

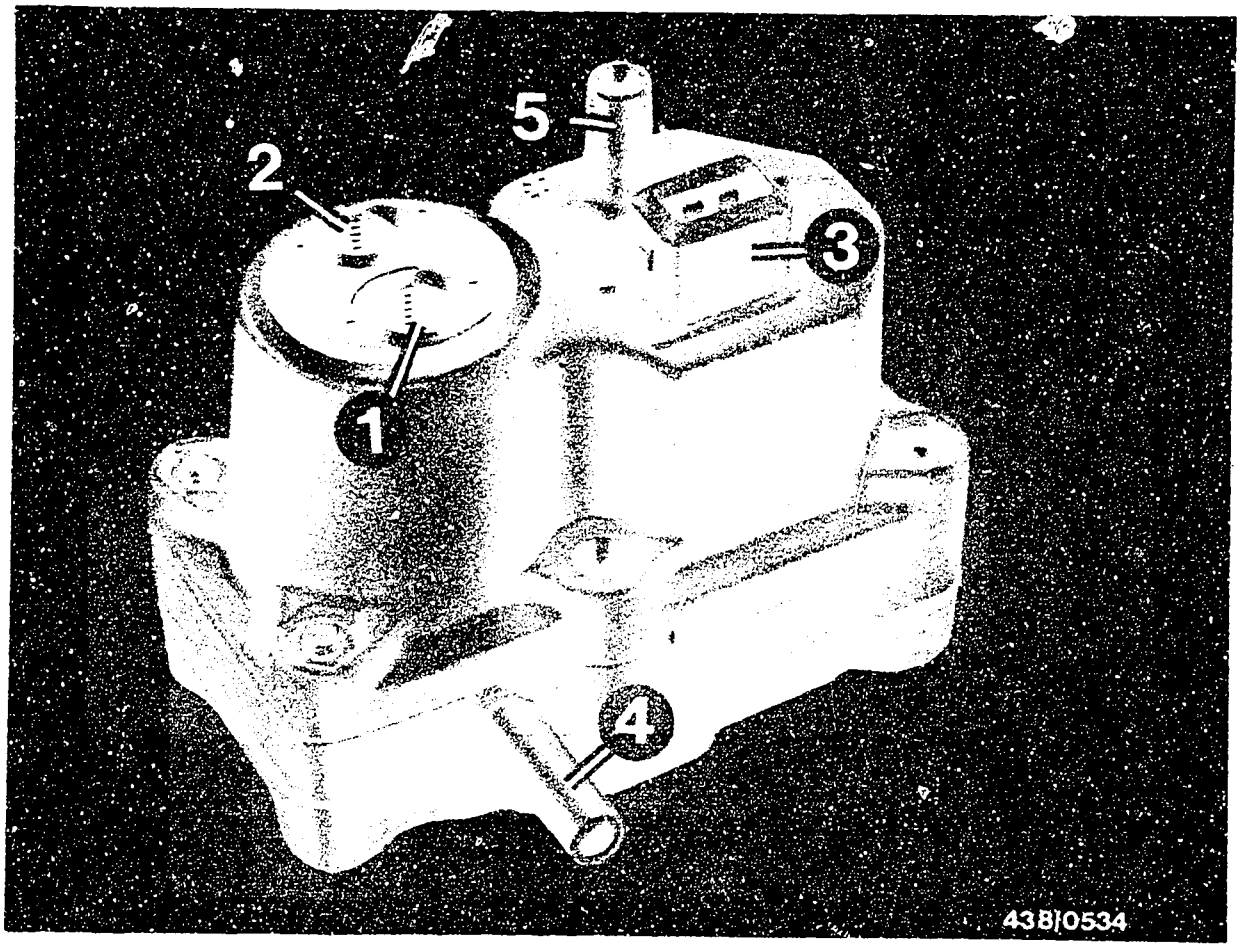
The warm-up regulator is a version for intake-manifold-pressure-controlled full-load enrichment. This means that the cold and warm control pressures are additionally influenced by the intake-manifold pressure acting on the full-load diaphragm of the warm-up regulator. The intake-manifold connection port (3) is on the top of the housing cover.



1 = Inlet connection (M 10 x 1)
2 = Return connection (M 8 x 1)
3 = Electric connection
4 = Connection for intake-manifold pressure (after throttle valve)
5 = Atmospheric connection (connection between air-flow sensor and throttle valve).

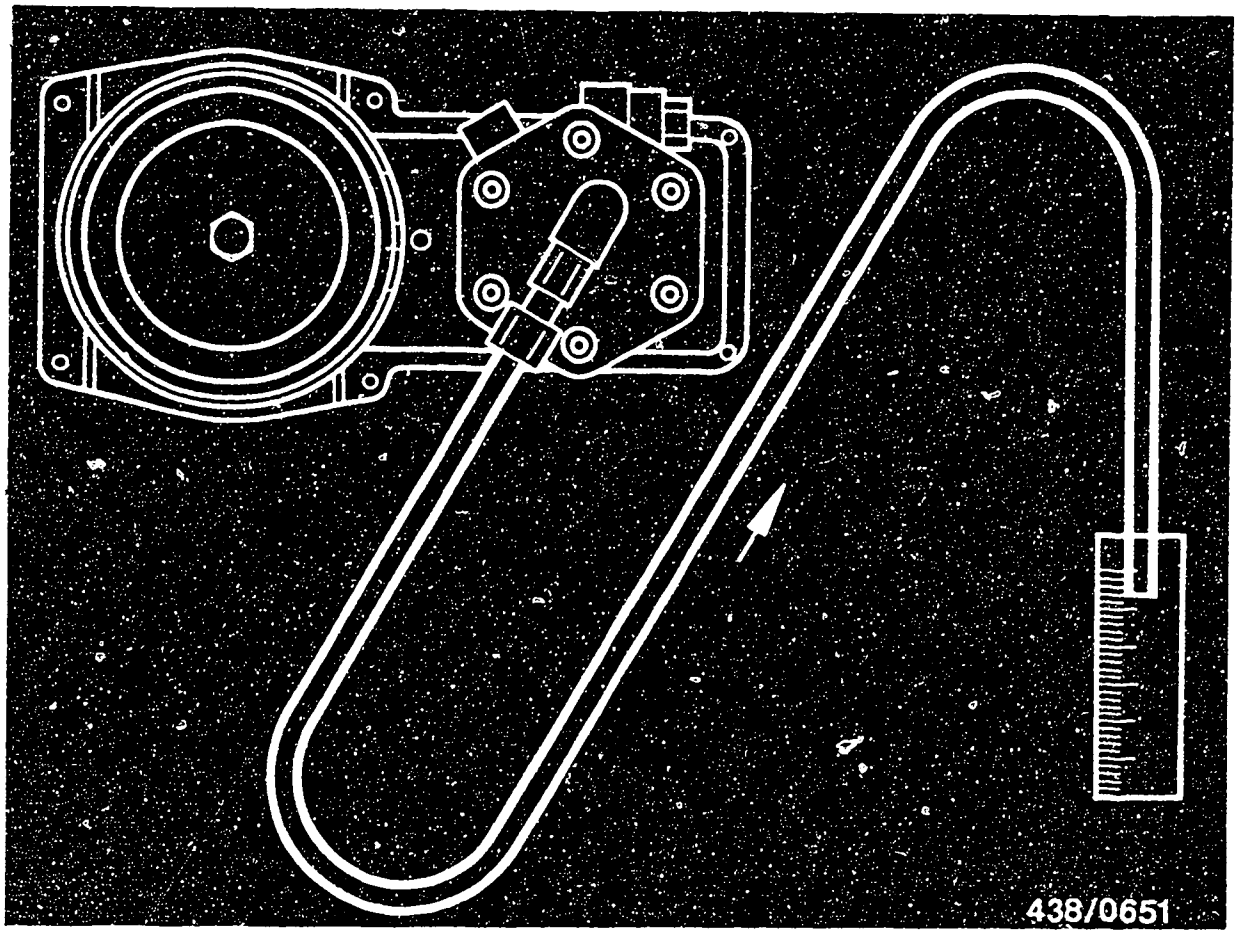
- Warm-up regulator No. 0 438 140 106/107

The warm-up regulator is a version for intake-manifold-pressure-controlled full-load enrichment disconnected from ambient-air pressure. This means that the cold and warm control pressures are additionally influenced by the intake-manifold pressure acting on the full-load diaphragm of the warm-up regulator.



1 = Inlet connection (M 10 x 1)
2 = Return connection (M 8 x 1)
3 = Electric connection
4 = Connection for intake-manifold pressure (after throttle valve)
5 = Atmospheric connection (connection between air-flow sensor and throttle valve)

The intake-manifold-pressure connection port (4) is located on the intermediate plate. On the top of the housing cover there is a connection pipe for atmospheric pressure (connection to the engine before the throttle valve) (5).



14.3 Checking the fuel delivery for the control-pressure circuit:

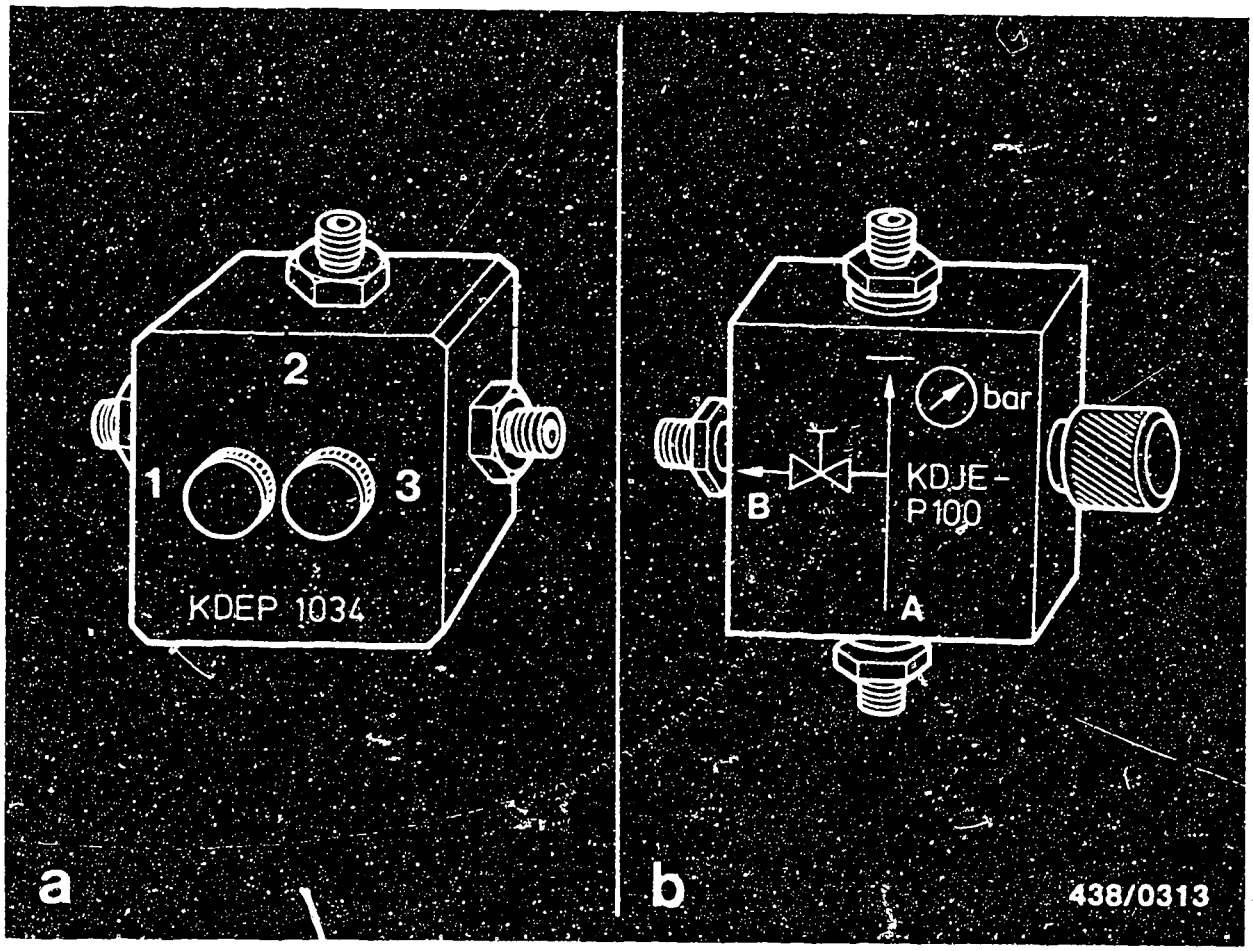
Before testing: Make sure that the electric fuel pump is operating properly.
Test specification: min. 850 cm^3/30 s.

Unscrew the control-pressure line (to the warm-up regulator) from the fuel distributor and screw connecting piece (thread M 8 x 1/M 12 x 1.5) from connecting parts set KDJE-P 100/10 on control-pressure port.
Connect one of the two connecting hoses of the pressure tester KDJE-P 100 (previously KDEP 1034) to the control-pressure port of the fuel distributor (thread M 12 x 1.5) and hold hose in graduate (approx. 0.5 litre capacity).

Switch on the electric fuel pump for 1 minute precisely by bridging the safety circuit. Measure delivery.

Test specification: 160...240 cm^3/min.

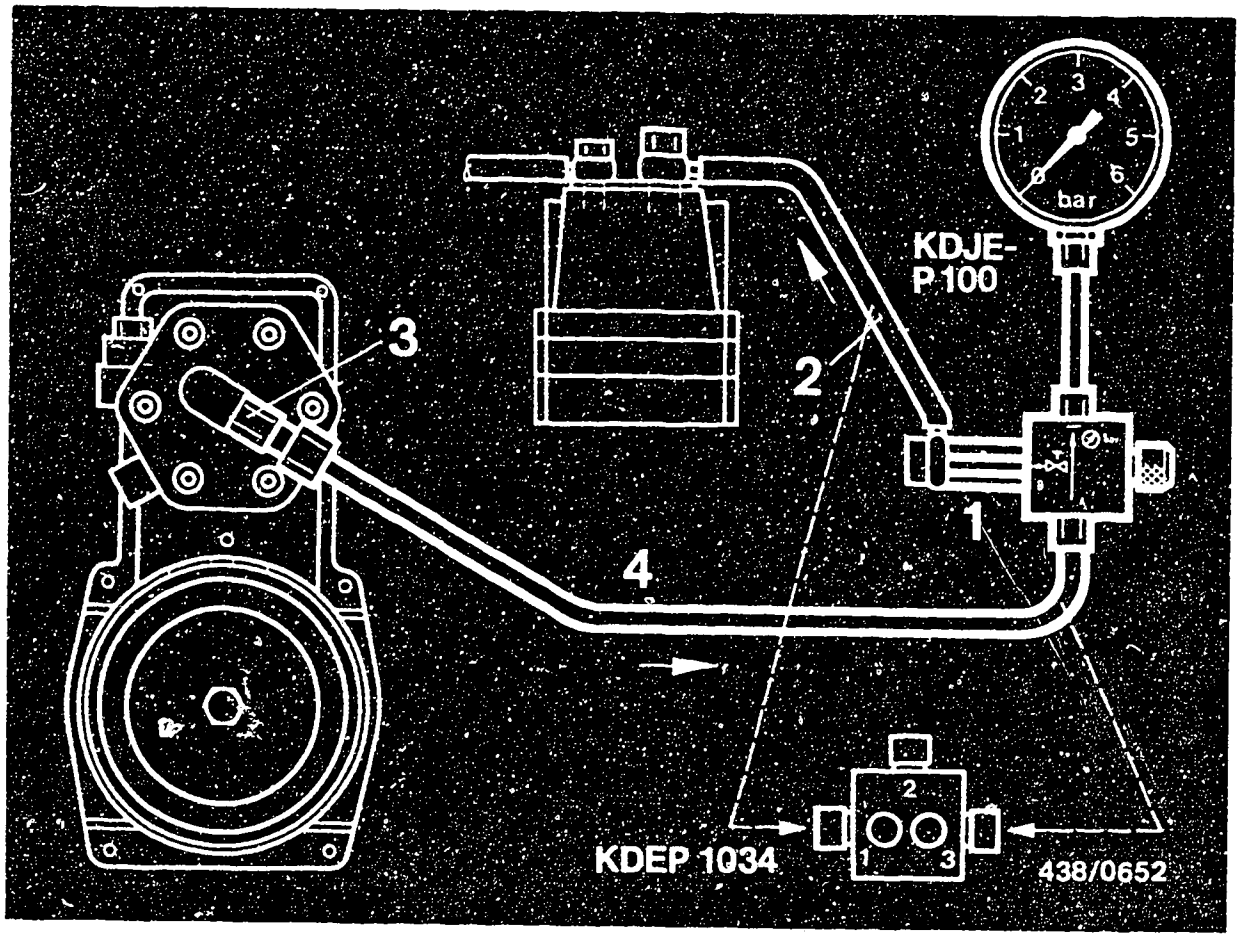
If the measured value is outside tolerance, the fault is in the fuel distributor.
Replace the fuel distributor.



14.4 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

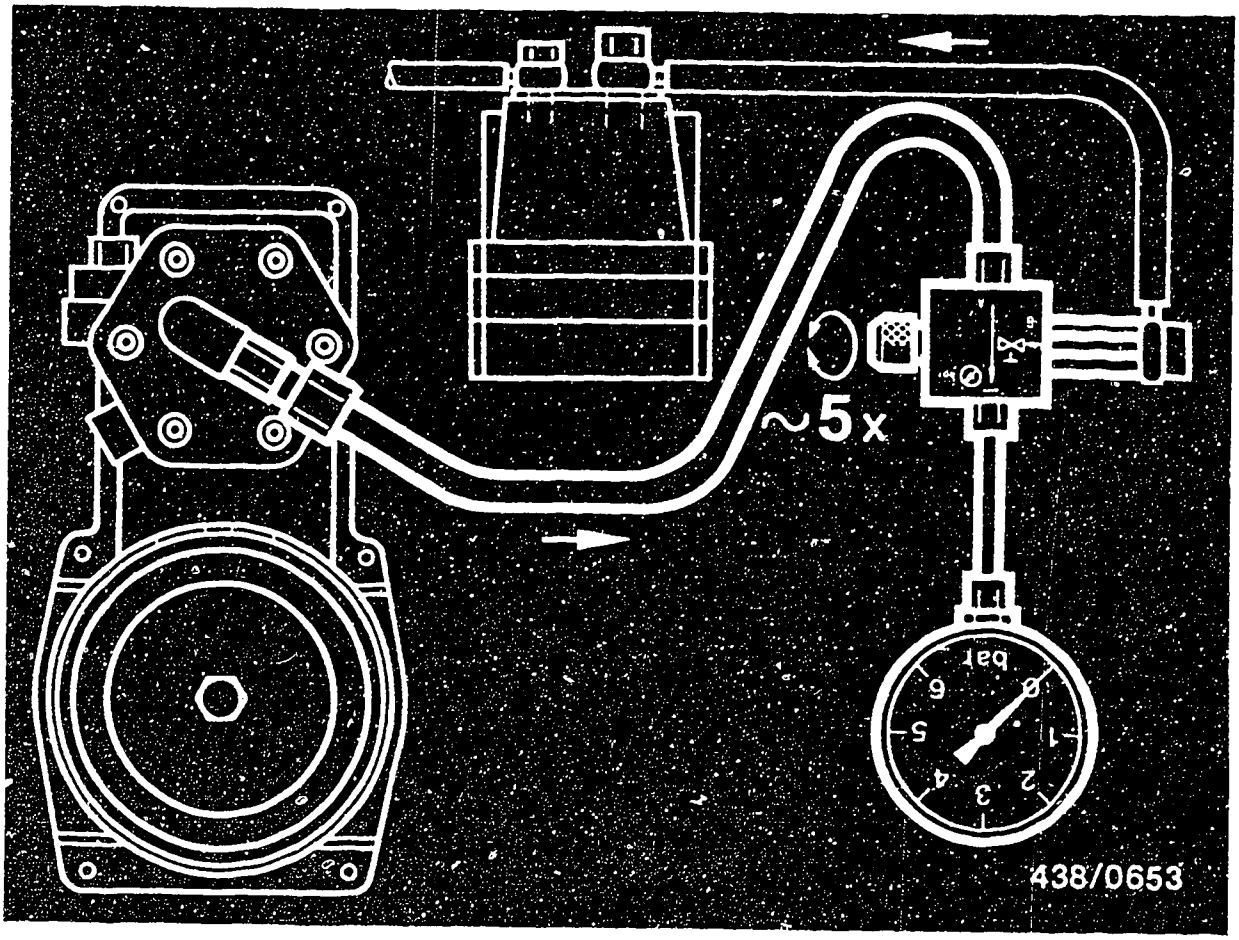
The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)

Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



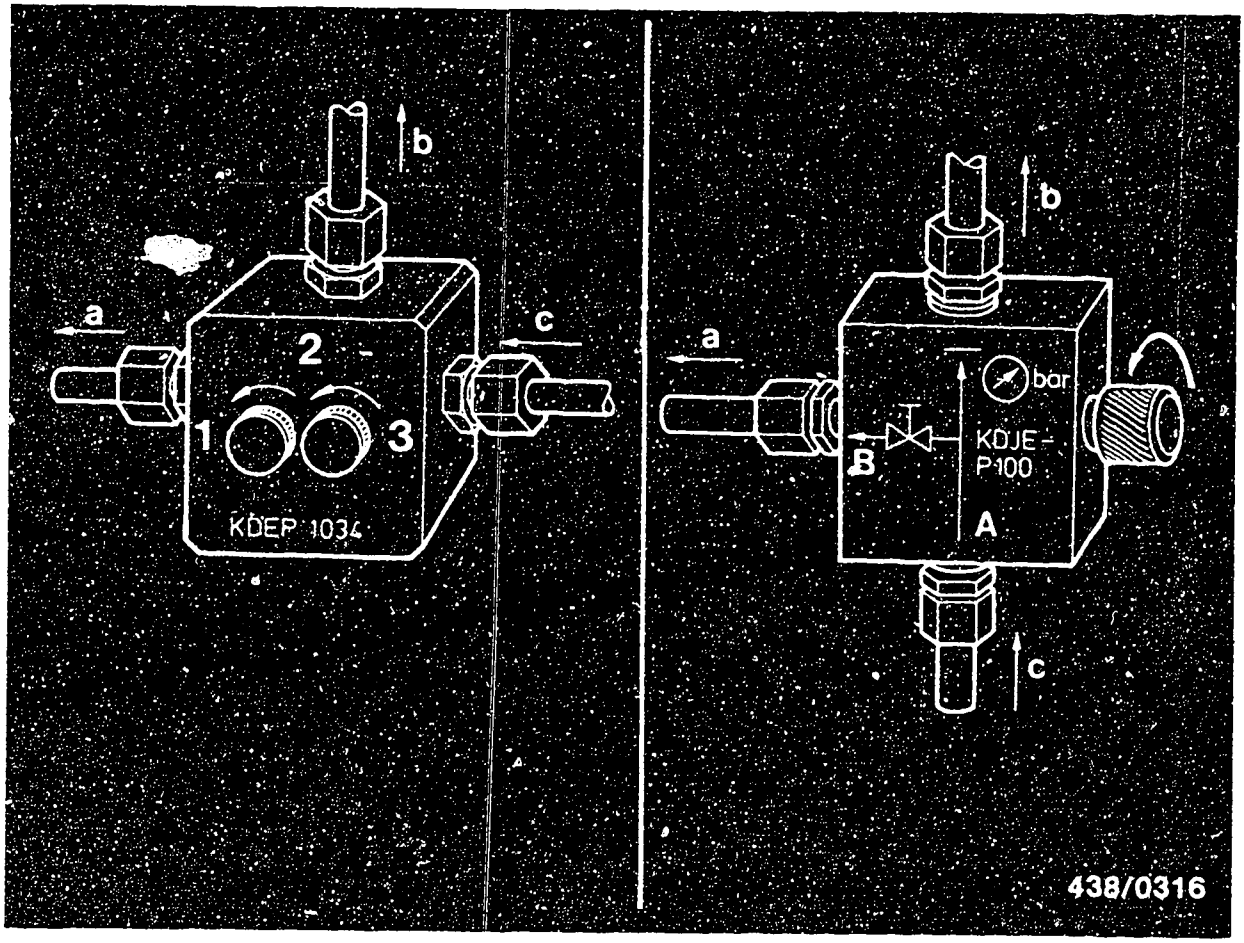
The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.
The connecting-parts set KDJE-P 100/10 is required.
Screw the adapter of connecting-parts set with seal ring onto connection port B or 1 of the directional-control valve (1).

Unscrew control-pressure line (to the warm-up regulator) from the fuel distributor and connect it to the adapter (2). Screw the connecting piece of the connecting-parts set to the control-pressure connection port of the fuel distributor (3) and connect it with connection port A or 3 of directional-control valve via connecting hose (4).



14.5 Bleeding the pressure tester:

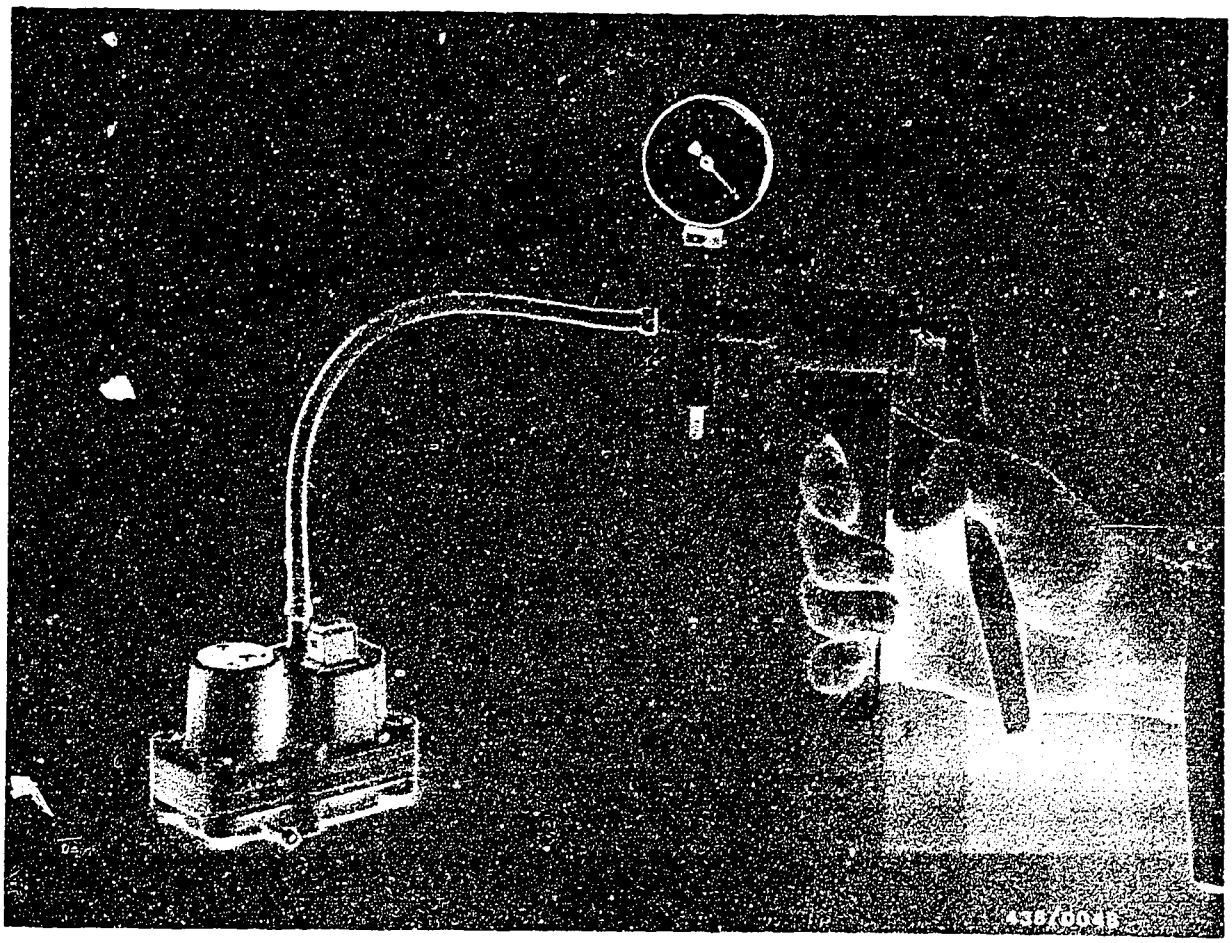
Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.
Let the pressure gauge hang down (hose fully extended).
Switch on the electric fuel pump by bridging the electrical safety circuit.
Open and close the valve screw of the directional-control valve (valve screw 1 in the case of KDEP 1034) in a 10-second rhythm about 5 times.
Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

14.6 Testing the "cold" control pressure

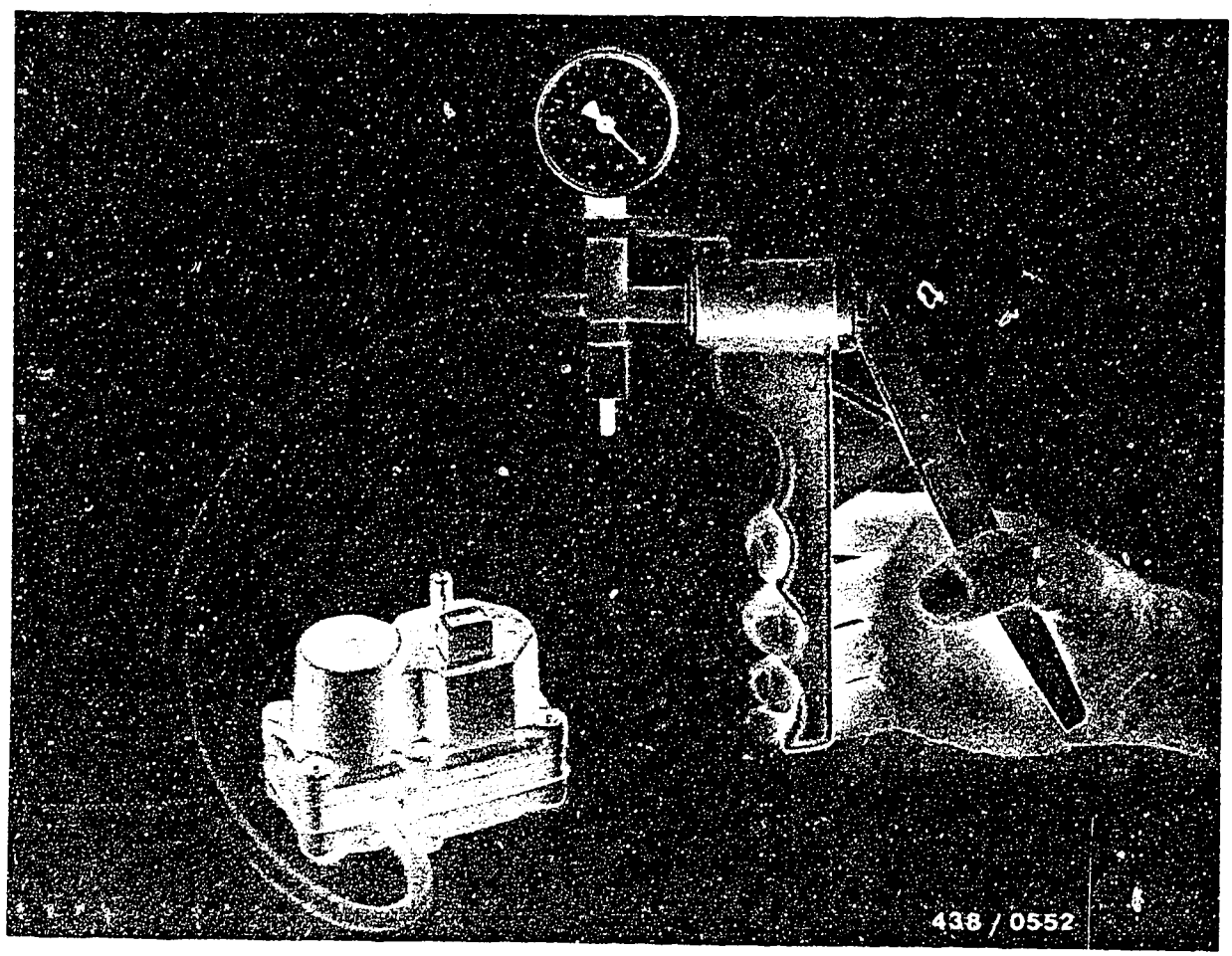
The test is performed with the engine switched off. The engine must be cold. For this purpose, the engine should have been switched off for several hours, preferably overnight.
Pull off the plug from the warm-up regulator.
Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034). Switch on the electric fuel pump by bridging the electrical safety circuit.
The pressure gauge now indicates the "cold" control pressure.



Part No. of warm-up regulator: 0 438 140 005

The control pressure is checked with simulated intake-manifold pressure, i.e. vacuum is applied to the warm-up regulator.
To do this, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator on the top of the housing. The picture shows testing with the recommended Mityvac hand vacuum pump.
Setting value for testing: 510...550 mbar
(385...415 mmHg)

The "cold" control pressure is indicated on the pressure gauge of the pressure tester.

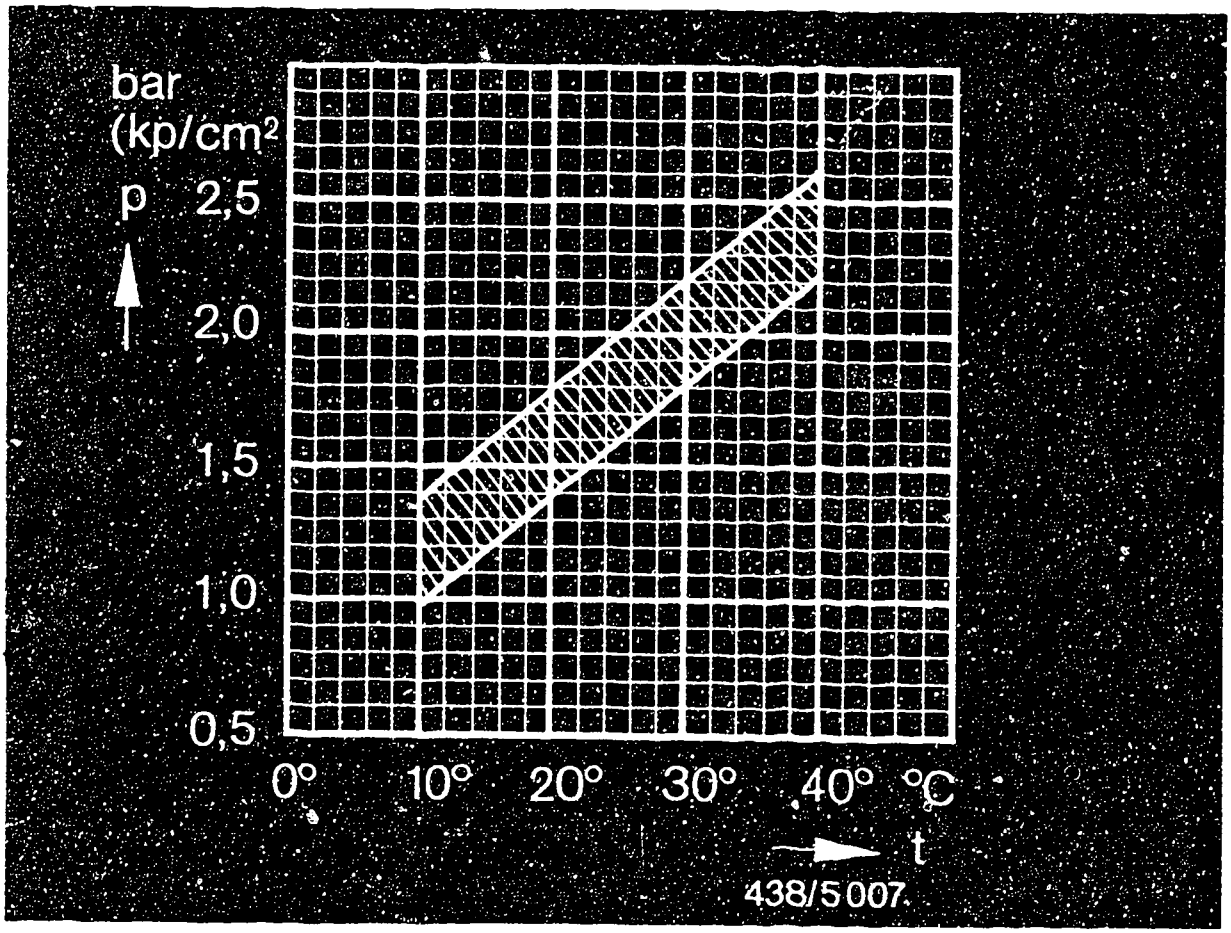


- Part No. of warm-up regulator: 0 438 140 106
  0 438 140 107

The control pressure is checked with simulated intake-manifold pressure, i.e. vacuum is applied to the warm-up regulator.
To do this, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator on the intermediate plate of the housing. The picture shows testing with the recommended Mityvac hand vacuum pump.

Setting value for testing: 465...600 mbar
(350...450 mmHg)

The "cold" control pressure is indicated on the pressure gauge of the pressure tester.



p = Control pressure (gauge pressure)
t = Ambient temperature

Warm-up regulator Part No.: 0 438 140 005
0 438 140 106
0 438 140 107

Calculate the nominal control pressure in accordance with the ambient temperature in the graph.

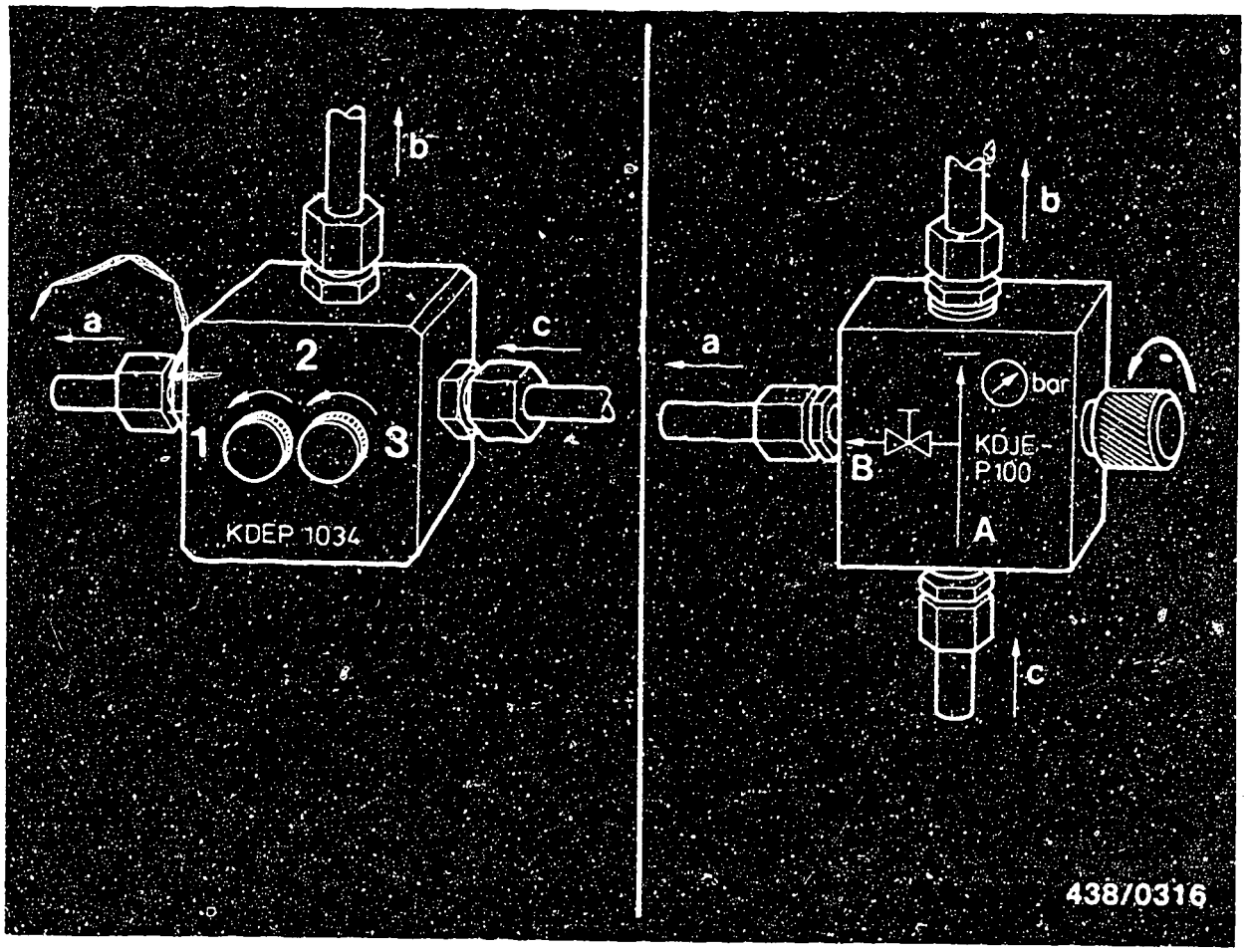
Example: Ambient temperature = 20°C
Nominal control pressure = 1.4...1.8 bar gauge pressure

If the measured "cold" control pressure differs from the nominal value, it may be due to one of the following faults:

- Fuel delivery for the control-pressure circuit too low or too high. Test fuel delivery.
  Test specification: 160...240 cm^3/min.

- Fuel return from the warm-up regulator blocked or restricted (if control pressure too high).
  Eliminate constriction.

- Warm-up regulator defective. Replace warm-up regulator.

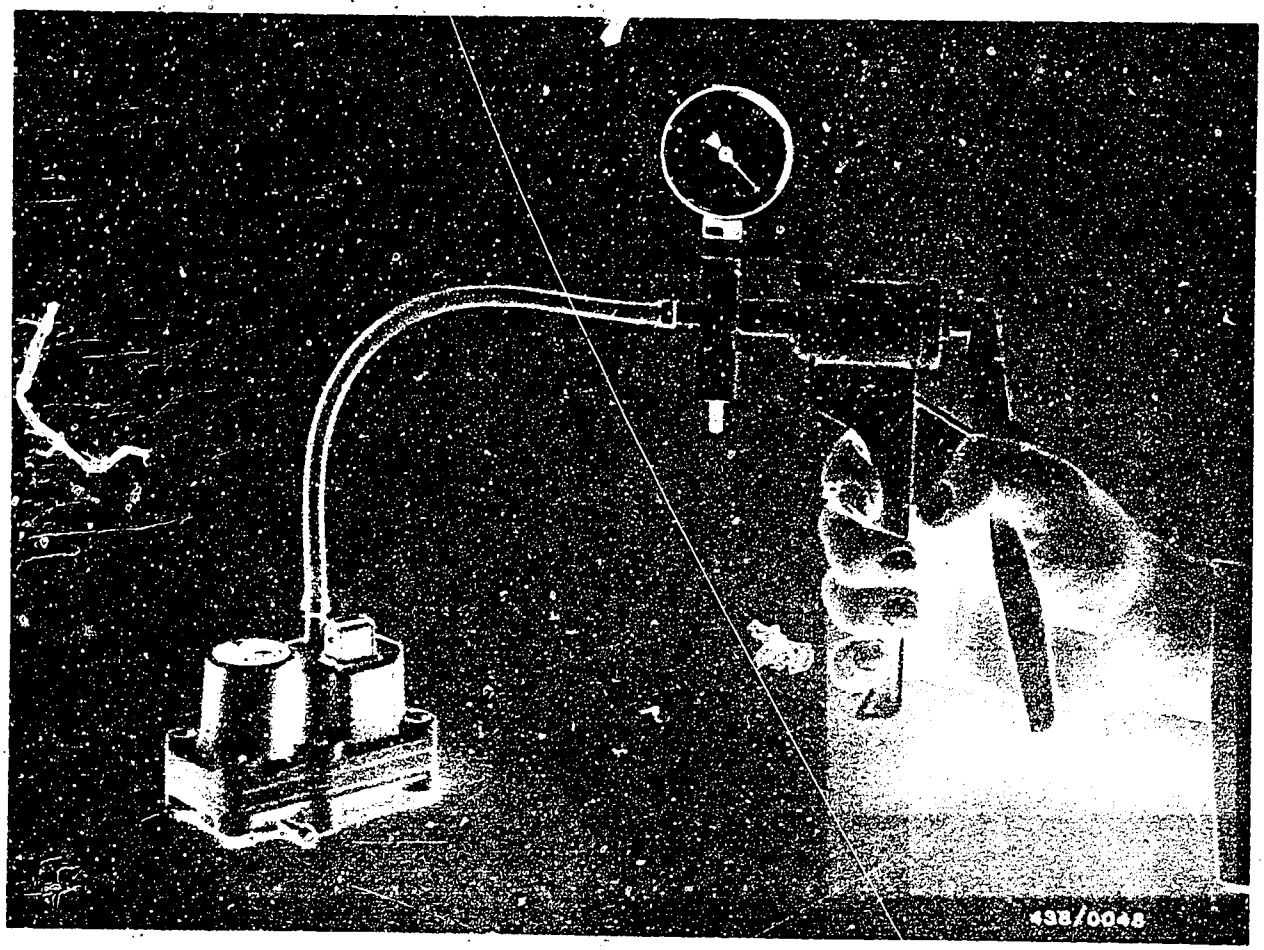


a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

14.7 Checking the "warm" control pressure

Warm-up regulator Part No.: 0 438 140 005
0 438 140 106
0 438 140 107

The test is performed with the engine switched off, once without intake-manifold pressure being applied, once with simulated intake-manifold pressure (vacuum pressure) applied.
Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034).

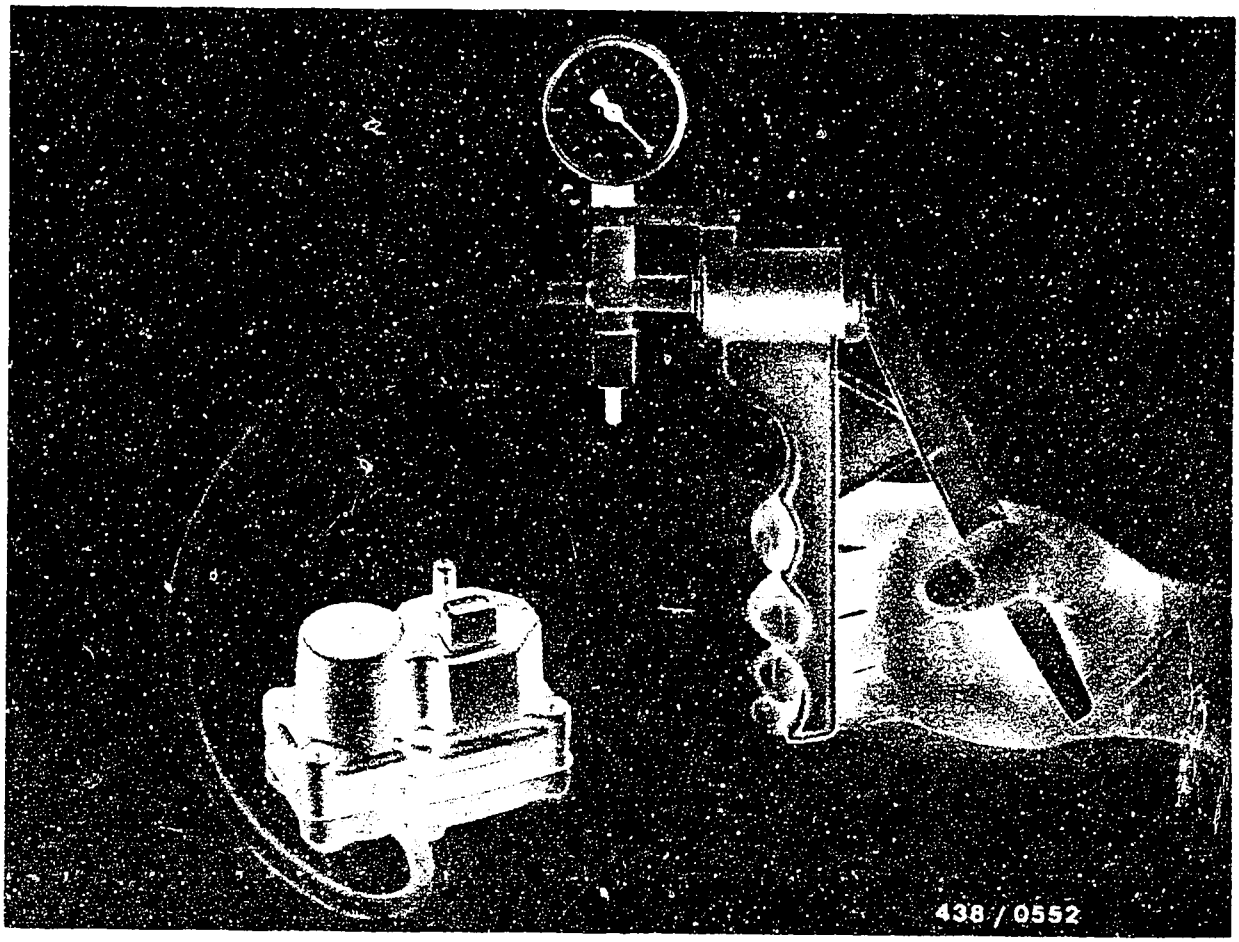


- Warm-up regulator Part No. 0 438 140 005

For testing with simulated intake-manifold pressure, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator (on top of the housing, next to the plug housing).

The picture shows the recommended Mityvac hand pump.

Setting value for the test: 510...550 mbar
(385...415 mmHg)



- Warm-up regulator Part No. 0 438 140 106
  0 438 140 107

For testing with simulated intake-manifold pressure, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator (in the intermediate plate of the housing).

The picture shows the recommended Mityvac hand pump.

Setting value for the test: 465...600 mbar
(350...450 mmHg)

Test procedure:

The temperature of the engine is not important.
Open the valve screw of the directional-control valve (both in the case of KDEP 1034).
Switch on the electric fuel pump by bridging the electrical safety circuit.

Plug the plug onto the warm-up regulator.
The control pressure increases (warm-up regulator in the process of shutting off) until the "warm" control pressure is reached.

Test first of all without the application of intake-manifold pressure, then test with simulated intake-manifold pressure (vacuum) in accordance with the values given below:

Test step	Test specifications*
"Warm" control pressure Part No. of warm-up regulator: 0 438 140 005	
• Test with atmospheric pressure (without vacuum)	2.7...3.1 bar (2.8...3.2 kgf/cm²)
• For testing, connect vacuum pump to intake-manifold-pressure connection of warm-up regulator.	
Setting value: 510...550 mbar (385...415 mmHg)	3.4...3.8 bar (3.5...3.9 kgf/cm²)

*Pressures in the test-specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure).

Test step	Test specifications*
"Warm" control pressure Part No. of warm-up regulator: 0 438 140 106	
• Test with atmospheric pressure (without vacuum)	2.5...2.9 bar (2.6...3.0 kgf/cm²)
• For testing, connect vacuum pump to intake-manifold connection of warm-up regulator. Setting value: 465...600 mbar (350...450 mmHg)	3.55...3.95 bar (3.65...4.05 kgf/cm²)
"Warm" control pressure Part No. of warm-up regulator: 0 438 140 107	
• Test with atmospheric pressure (without vacuum)	2.7...3.1 bar (2.8...3.2 kgf/cm²)
• For testing, connect vacuum pump to intake-manifold connection of warm-up regulator. Setting value: 465...600 mbar (350...450 mmHg)	3.55...3.95 bar (3.95...4.05 kgf/cm²)

* Pressures in the test-specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure)

If the measured "warm" control pressure differs from the test specification, this may be due to one of the following faults:

If control pressure too high:

- Fuel delivery for the control-pressure circuit too high.
  Test fuel delivery.
  Test specification: 160...240 cm^3/min.

- Fuel return from the warm-up regulator blocked or constricted. Eliminate constriction.

- Warm-up regulator has hydraulic defect.
  Replace warm-up regulator.

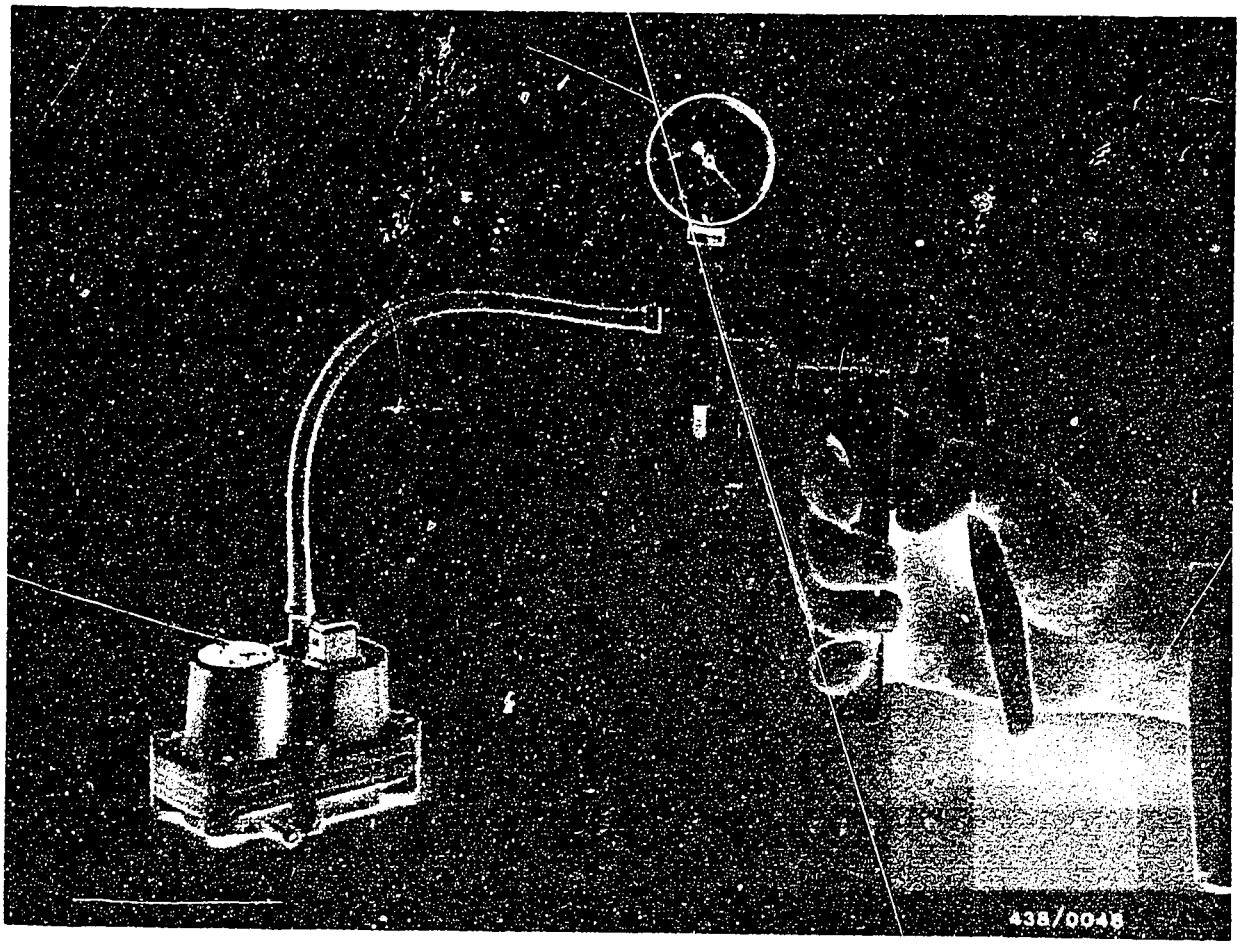
If control pressure too low:

- Power supply open-circuit.
  Eliminate open circuit. Ensure that the plug is contacting properly.

- Battery voltage too low, voltage drop.
  Eliminate voltage drop. Minimum voltage at connector: 11.5 V.
  If necessary, repeat test with engine running in order to obtain the normal generator voltage of approx. 14 V when the vehicle is in operation.

- Fuel delivery for the control-pressure circuit too low.
  Test fuel delivery.
  Test specification: 160...240 cm^3/min.

- Warm-up regulator defective. Heating coil open-circuit. Hydraulic defect. Replace warm-up regulator.

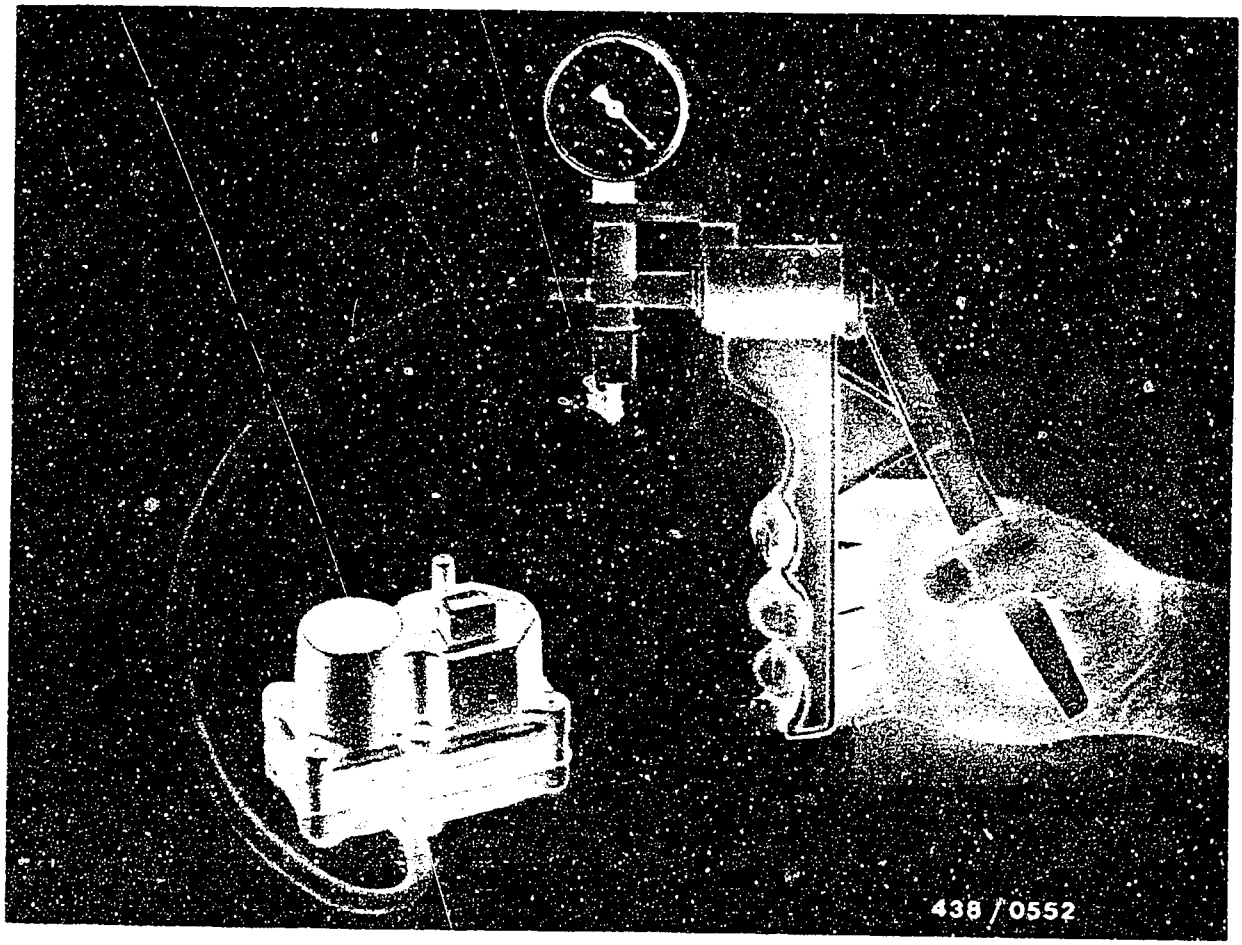


- Testing the full-load diaphragm for leaks on warm-up regulator 0 438 140 005

Switch off the electric fuel pump.
Connect the "Mityvac" hand vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator and build up a vacuum.

Setting value: 510...550 mbar (385...415 mmHg).

Max. pressure drop within 15 s 100 mbar (75 mmHg).
If the pressure drop is too great, replace the warm-up regulator.



Testing the full-load diaphragm for leaks
on warm-up regulators 0 438 140 106
0 438 140 107

Switch off the electric fuel pump.
Connect the "Mityvac" hand vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator and build up a vacuum.

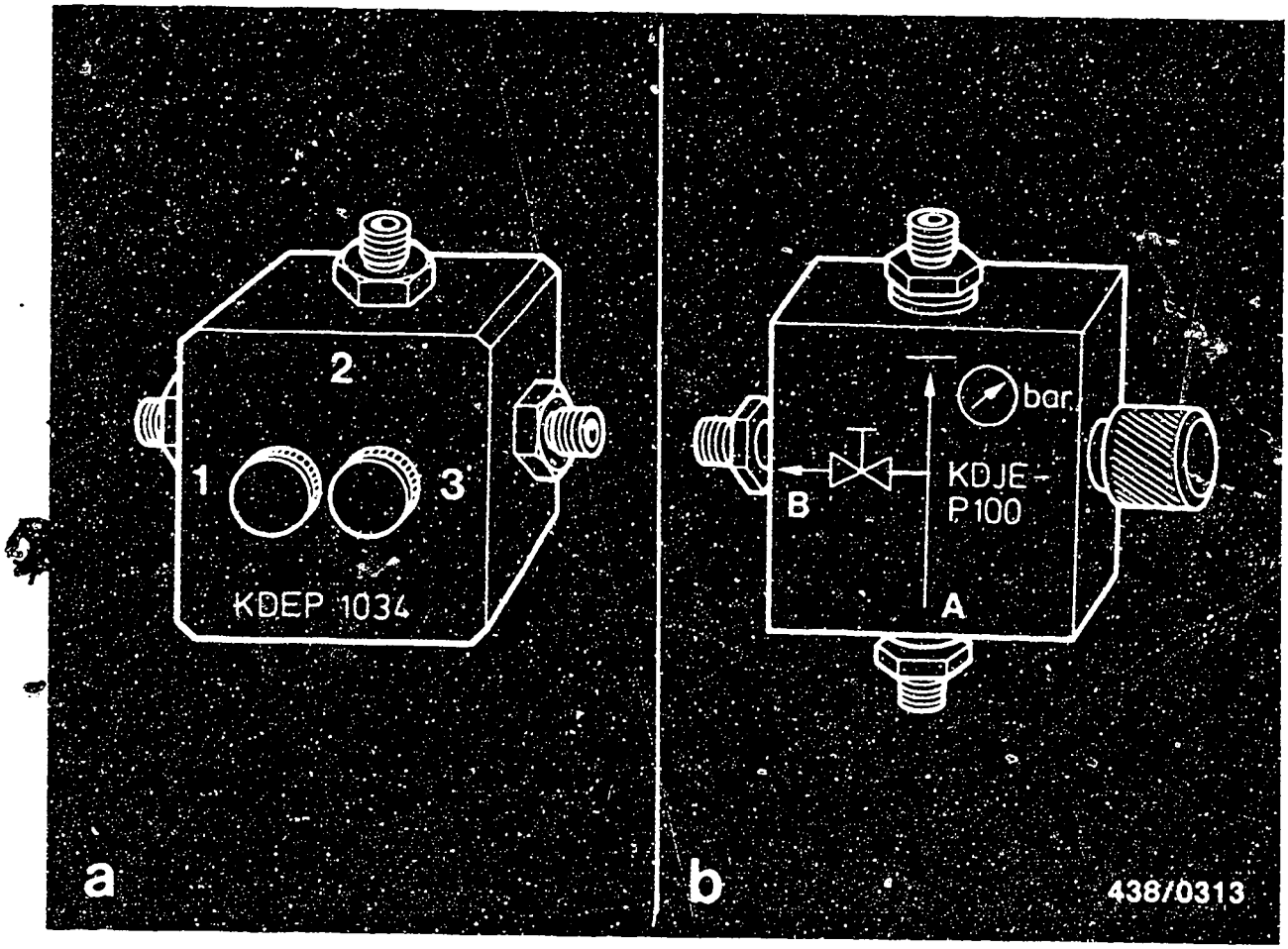
Setting value: 465...600 mbar (350...450 mmHg)

Max. pressure drop within 15 s 100 mbar (75 mmHg).
If the pressure drop is too great, replace the warm-up regulator.

Finally, check the condition and the correct fitting of the connecting hose from the intake manifold to the warm-up regulator. If necessary, replace the hose.

When the warm-up regulator has been replaced or a fault remedied, carry out the idle adjustment with the engine at normal operating temperature.

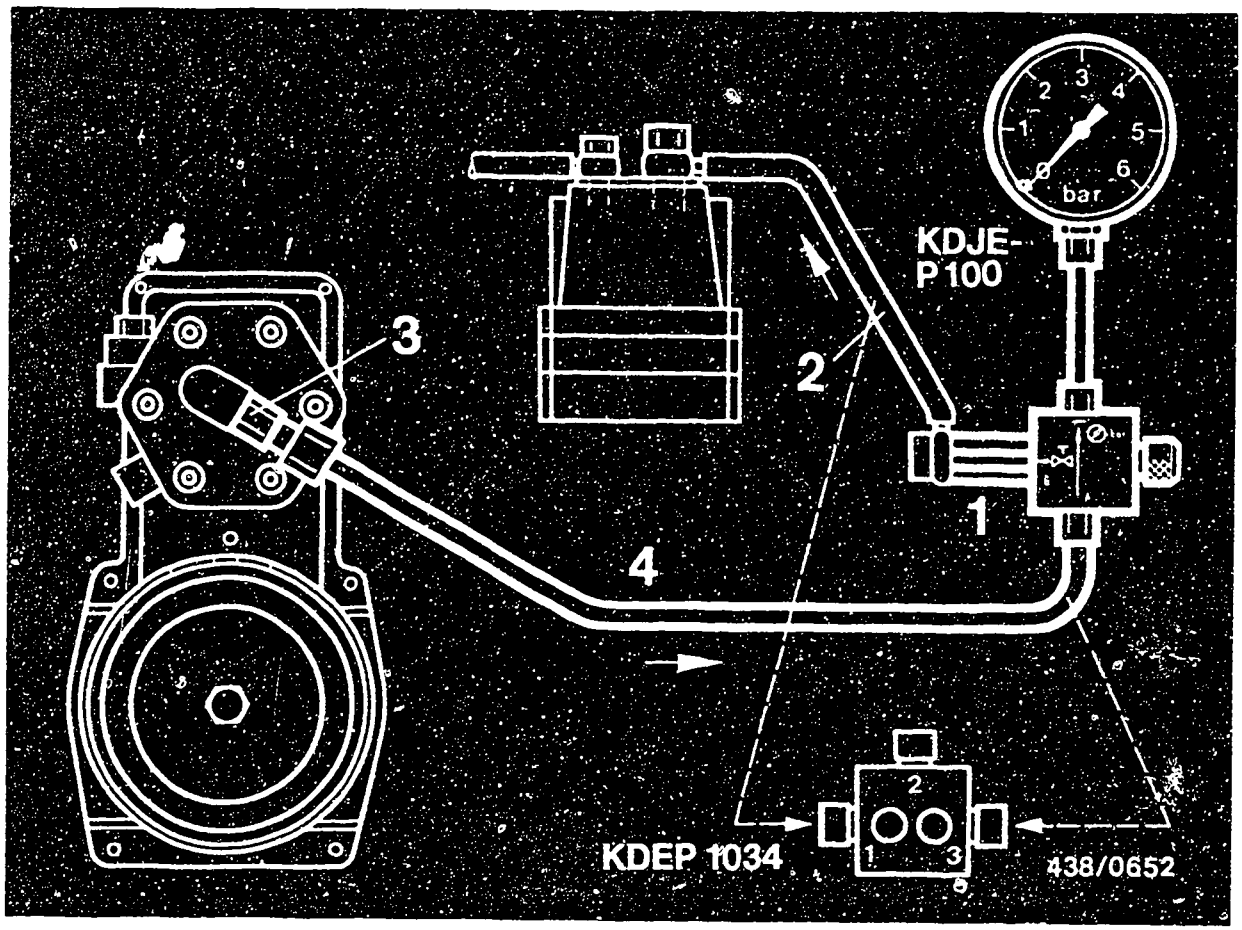
Idle adjustment is described on Coordinates F 12.



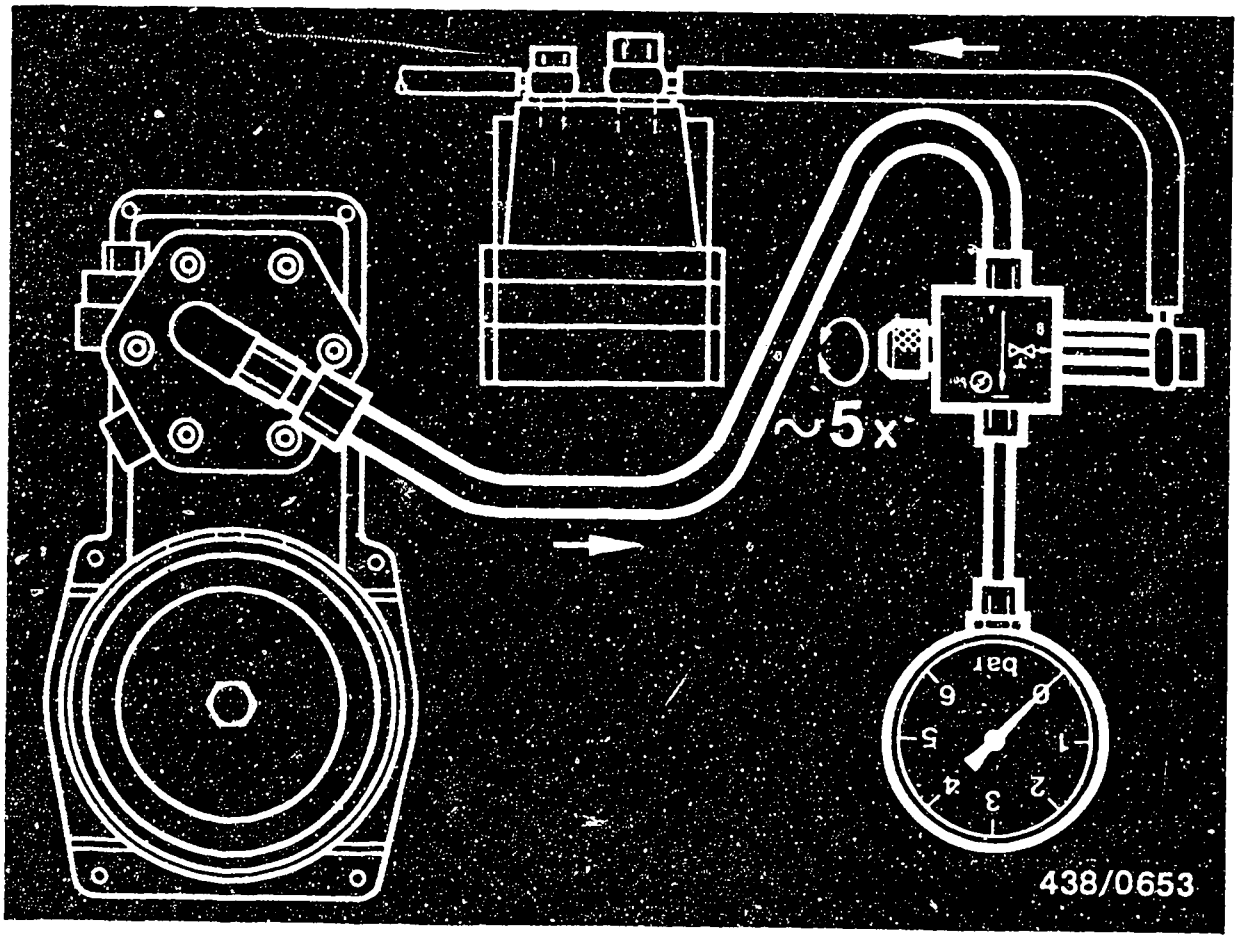
15. Testing and adjusting the primary (system) pressure:

15.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)
Caution: When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.

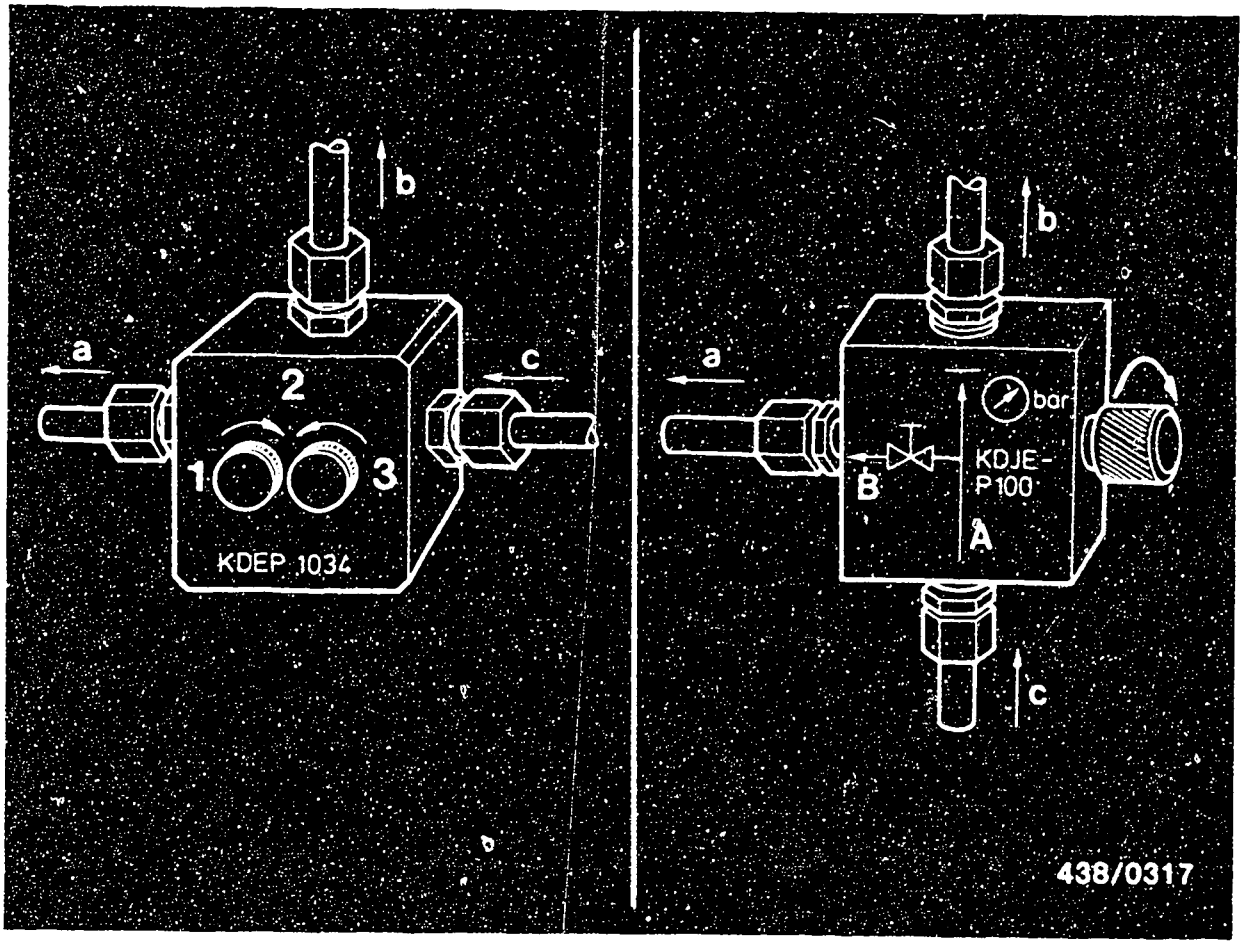


The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.
The connecting-parts set KDJE-P 100/10 is additionally required.
Screw the adapter of the connecting-parts set with seal ring to connection port B or 1 of the directional-control valve (1).
Unscrew the control-pressure line (to warm-up regulator) from the fuel distributor and connect to the adapter (2).
Screw connecting-piece of the connecting-parts set onto control-pressure connection port of the fuel distributor (3) and connect with connection port A or 3 of the directional-control valve via connecting hose (4).



15.2 Bleeding the pressure tester:

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.
Let the pressure gauge hang down (hose fully extended).
Switch on the electrical fuel pump by bridging the electrical safety circuit:
Open and close the valve screw of the directional-control valve (valve screw 1 in the case of KDEP 1034) in a 10-second rhythm about 5 times.
Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

15.3 Testing the primary pressure:

The test is performed with the engine switched off.
The temperature of the engine is not important.
Close the valve screw of directional-control valve KDJE-P 100.
In the case of KDEP 1034, close valve screw 1, open valve screw 3.
Switch on the electric fuel pump by bridging the electrical safety circuit.
The pressure gauge now indicates the primary pressure.

Fuel distributor Part No.	Test specifications - primary pressure (gauge pressure)
0 438 100 028 0 438 100 108 }	4,5...5,2 bar (4.6...5.3 kgf/cm²)

Possible causes for too low a primary pressure:

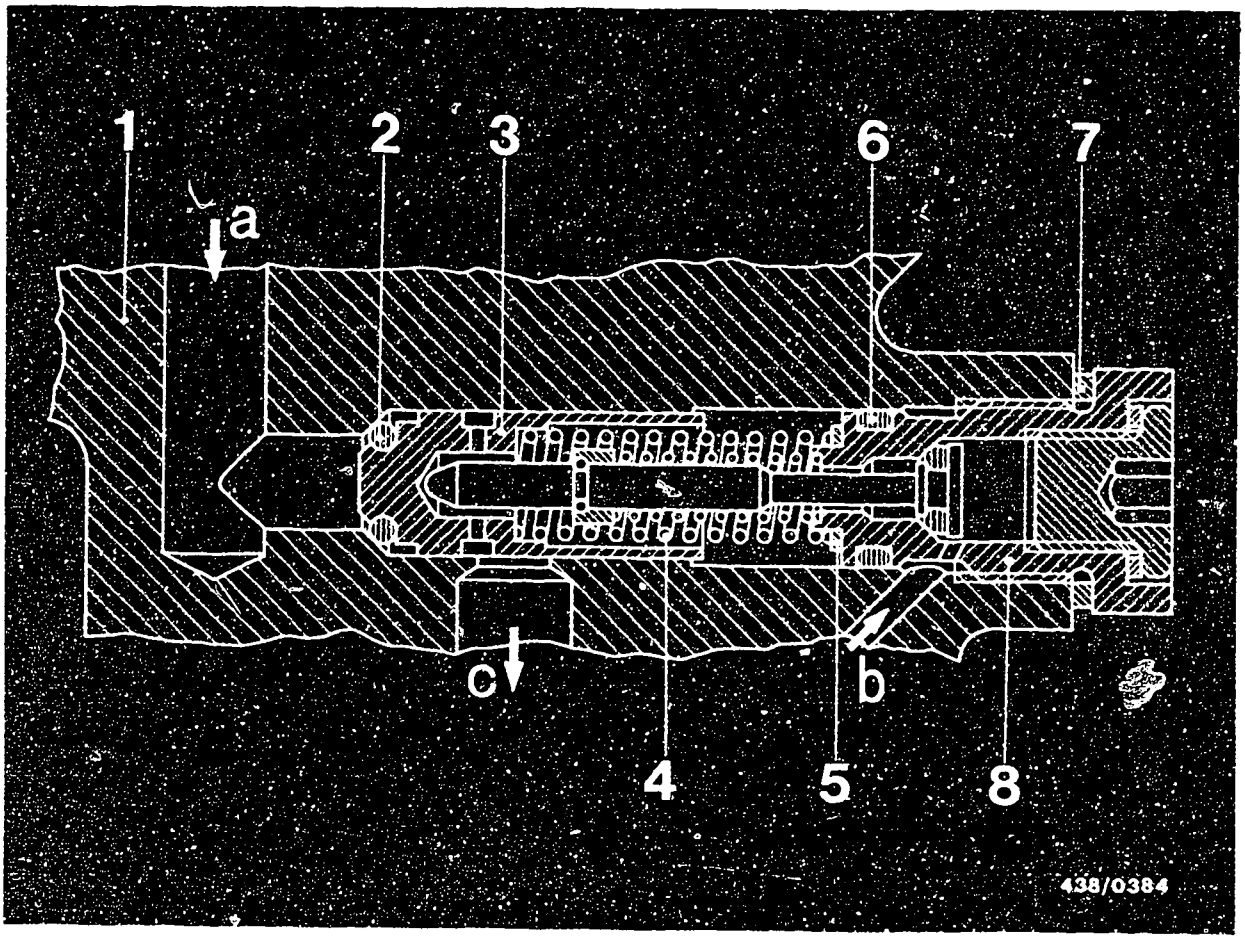
- Fuel supply faulty.
  (Delivery of electric fuel pump too low).
- Primary pressure set incorrectly.

A precondition for readjustment of the primary pressure is always that the fuel supply is in order. Measure the fuel delivery. Test specification: min. 850 cm³/30 s.

Possible causes for too high a primary pressure:

- A restriction in the return line leading to the fuel tank.
- Primary-pressure regulator set incorrectly.

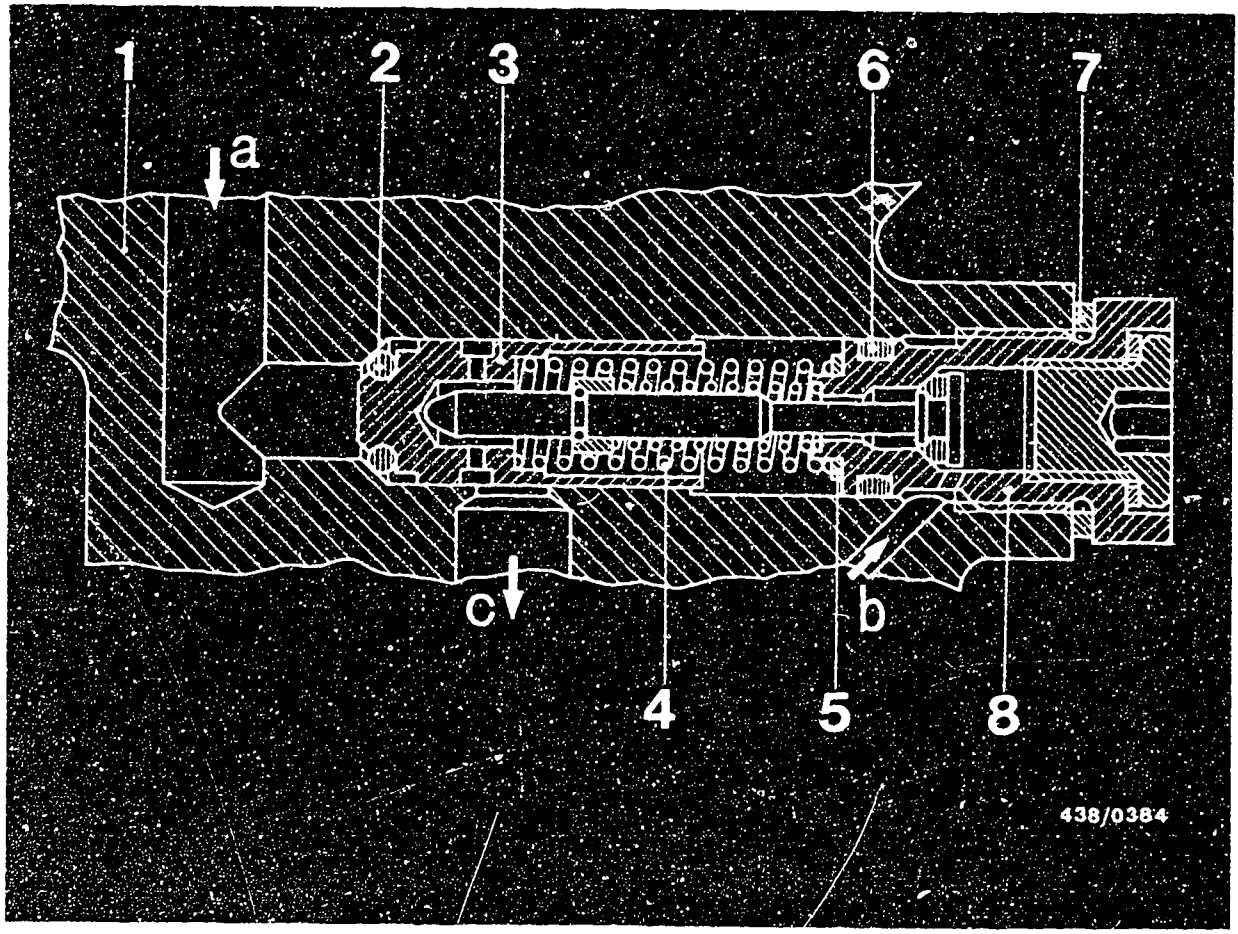
For this reason, before readjusting too high a primary pressure, always first check the condition of the return line leading to the fuel tank.



a = Primary pressure
b = From warm-up regulator
c = Fuel return
1 = Fuel-distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = O-ring
7 = Flat seal ring
8 = Screw plug

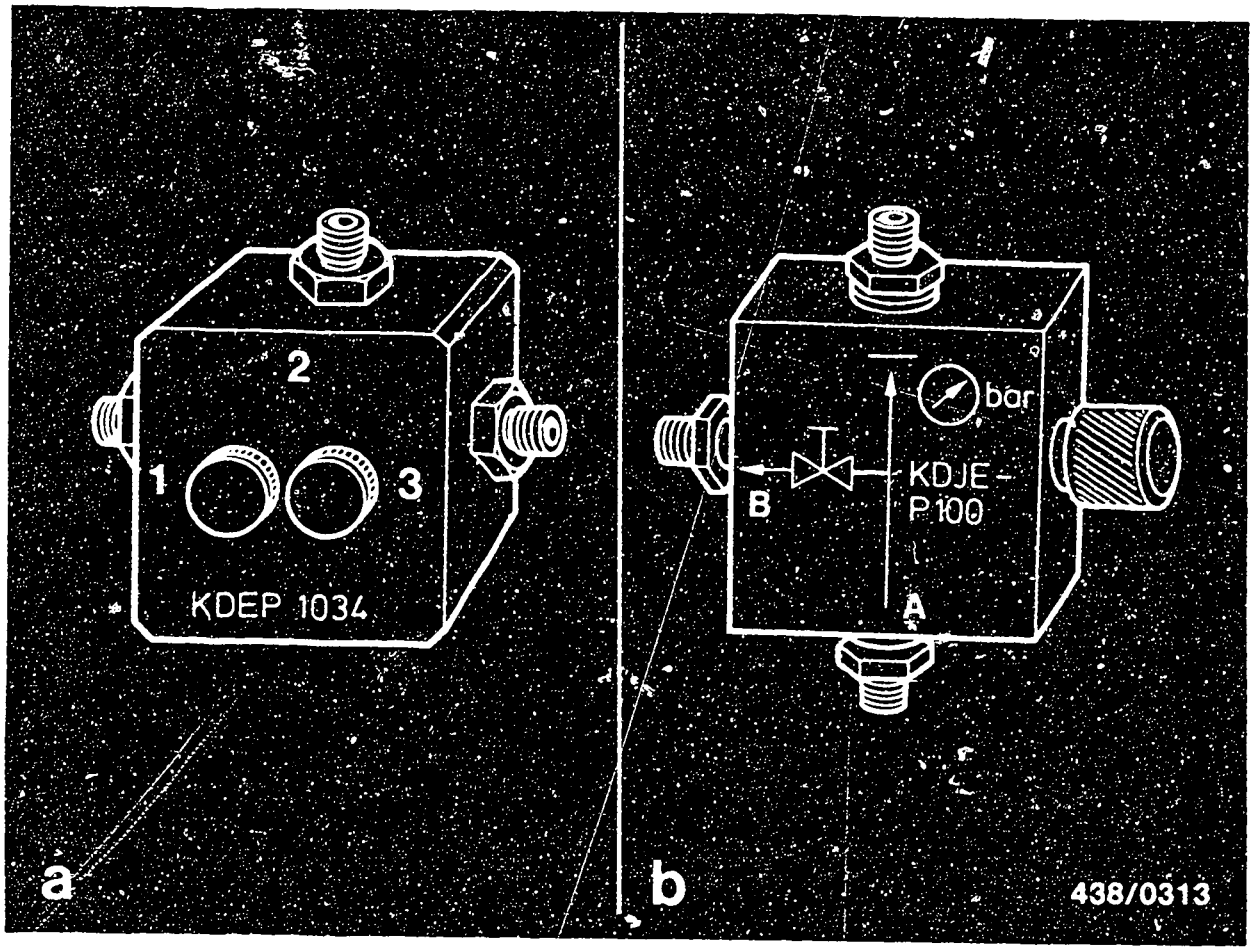
15.4 Adjusting the primary pressure:

Fuel distributor Part No.	Setting values - primary pressure (gauge pressure)
0 438 100 028 0 438 100 108 }	4.7...4.9 bar (4.8...5.0 kgf/cm²)



The primary pressure is readjusted by replacing the shims (Item 5).
Note: 0.1 mm more of shim thickness means about 0.15 bar pressure increase and vice versa.

To do this, screw out the large screw plug (Item 8) together with the push valve. After carrying out the adjustment, always fit the screw plug with a new flat seal ring (Item 7) and O-ring (Item 6).
The control piston (Item 3) of the primary-pressure regulator must not be lost. It was matched specially to the fuel distributor housing in the manufacturing plant and therefore is the only part of the primary-pressure regulator which must not be replaced.



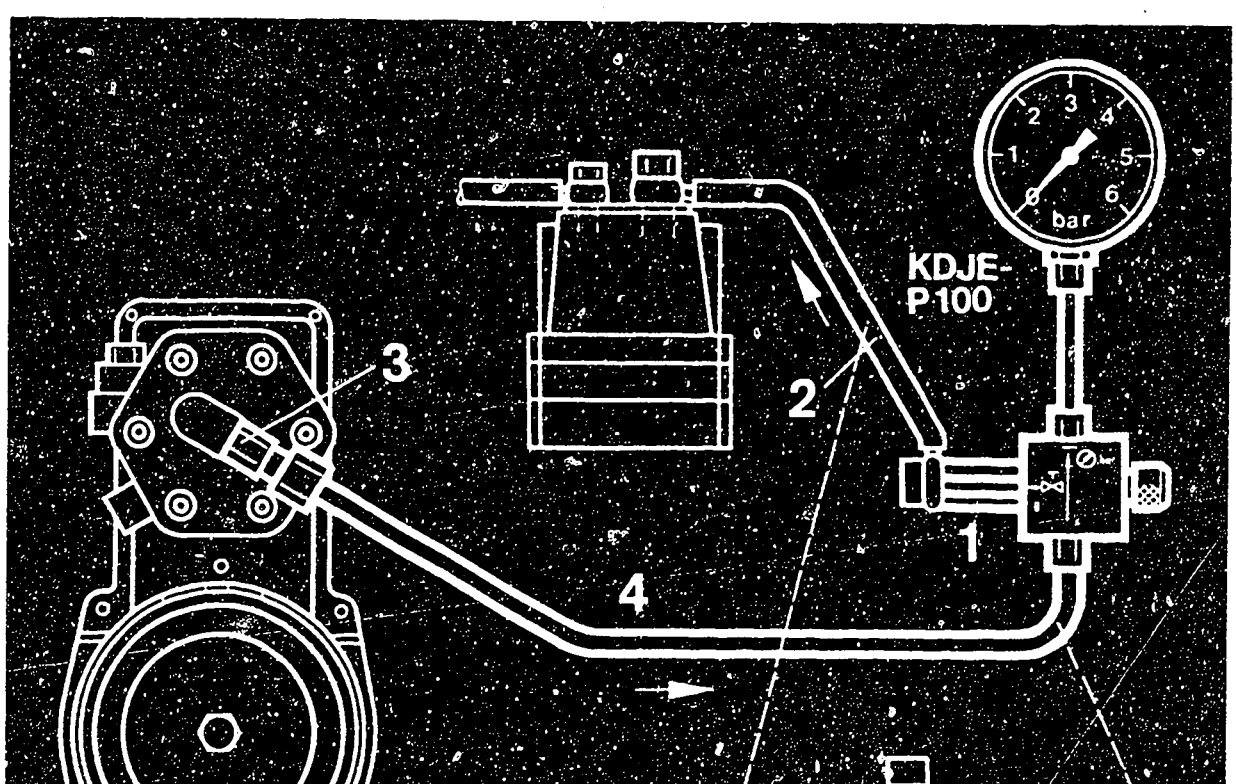
16. Testing the entire fuel system for leaks.

16.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b).

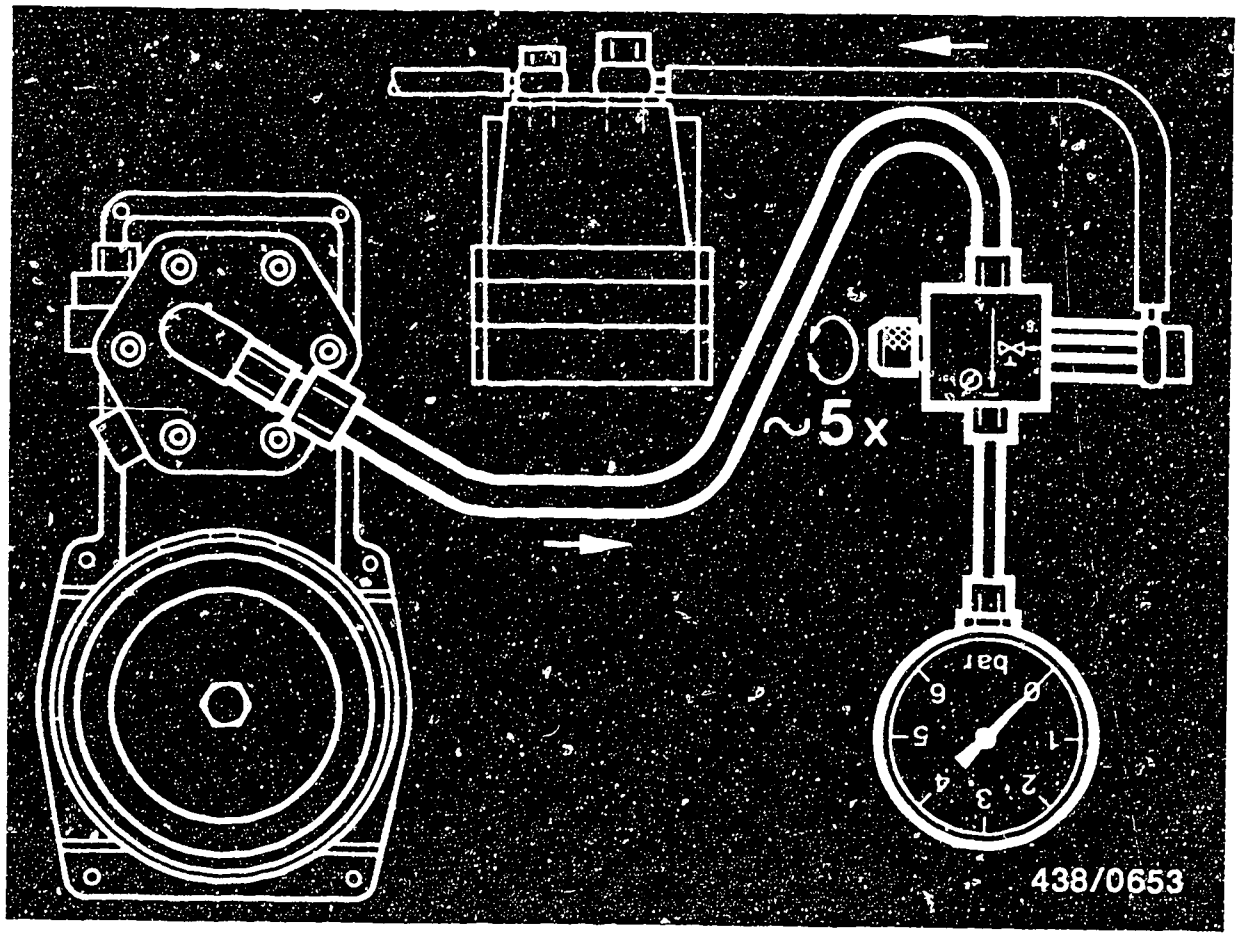
The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)

Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



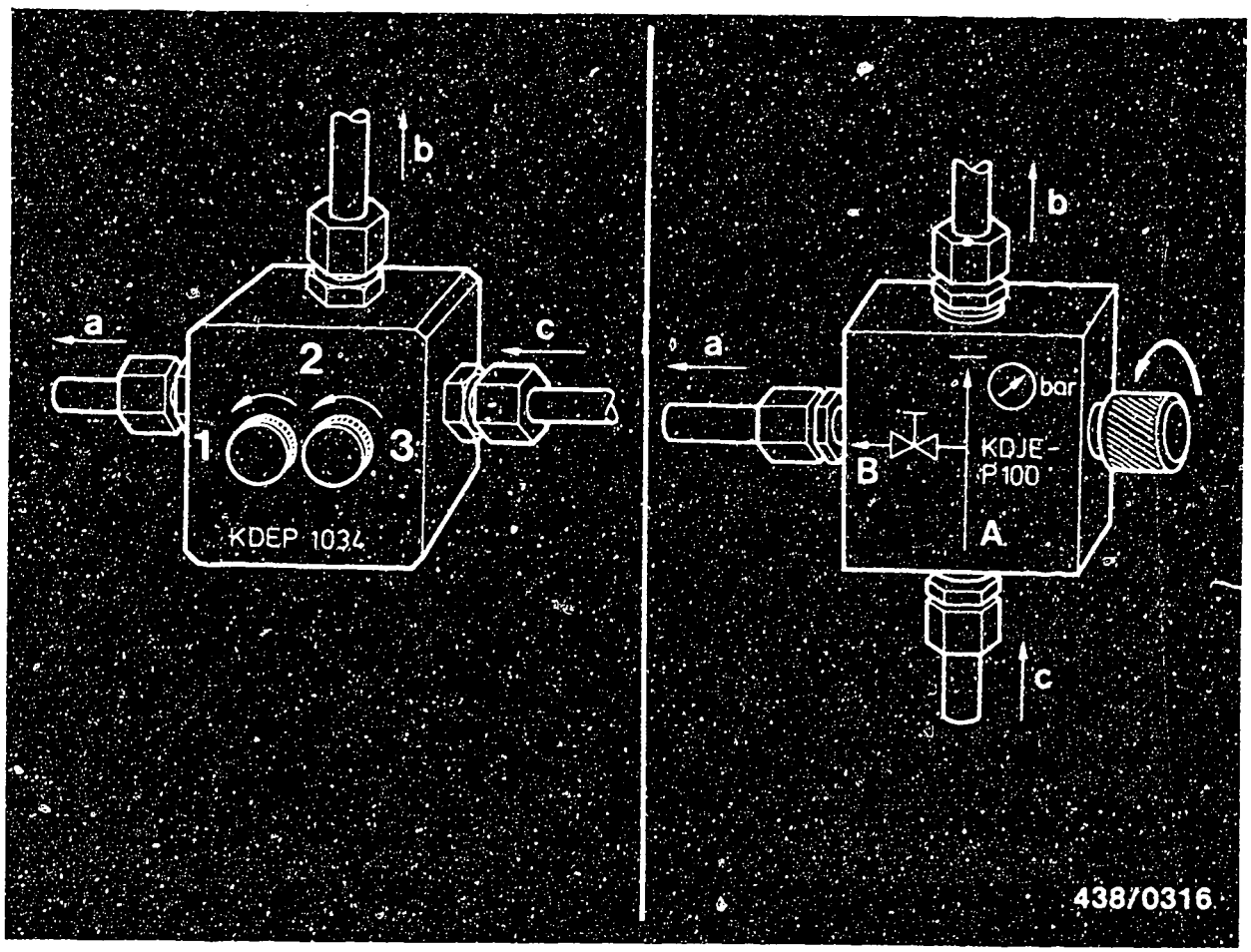
The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.
The connecting-parts set KDJE-P 100/10 is additionally required.
Screw the adapter of the connecting-parts set with seal ring to connection port B/1 of directional-control valve (1).

Unscrew the control-pressure line (to warm-up regulator) from the fuel distributor and connect to the adapter (2).
Screw connecting-piece of connecting-parts set to control-pressure connection port of the fuel distributor (3) and connect with connection port A/3 of the directional-control valve via connecting hose (4).



16.2 Bleeding the pressure tester:

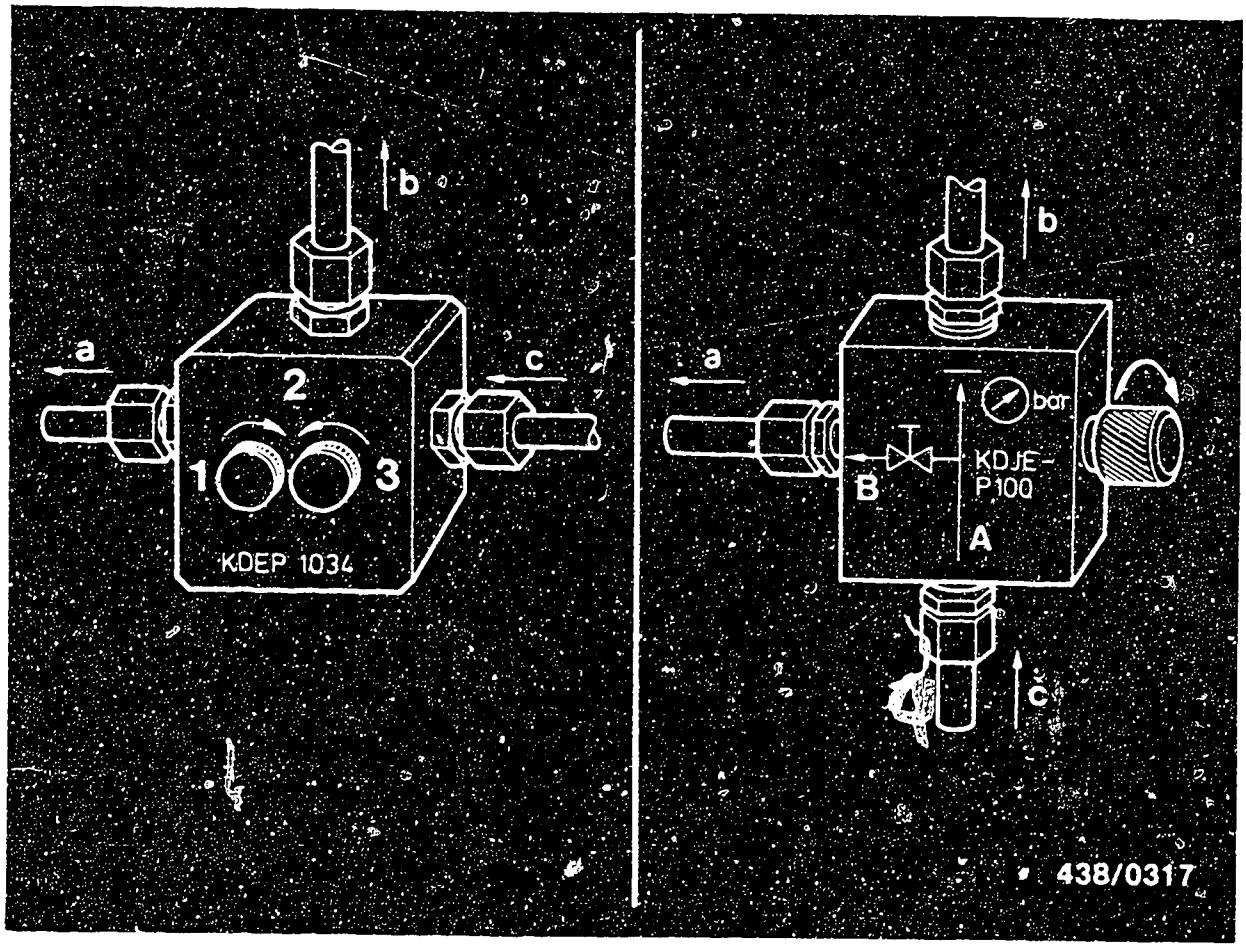
Disconnect the electric plug from the warm-up regulator and the auxiliary-air valve.
Let the pressure gauge hang down (hose fully extended).
Switch on the electric fuel pump by bridging the electrical safety circuit.
Open and close the valve screw of the directional-control valve (valve screw 1 in the case of KDEP 1034) in a 10-second rhythm about 5 times.
Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

16.3 Leak test:

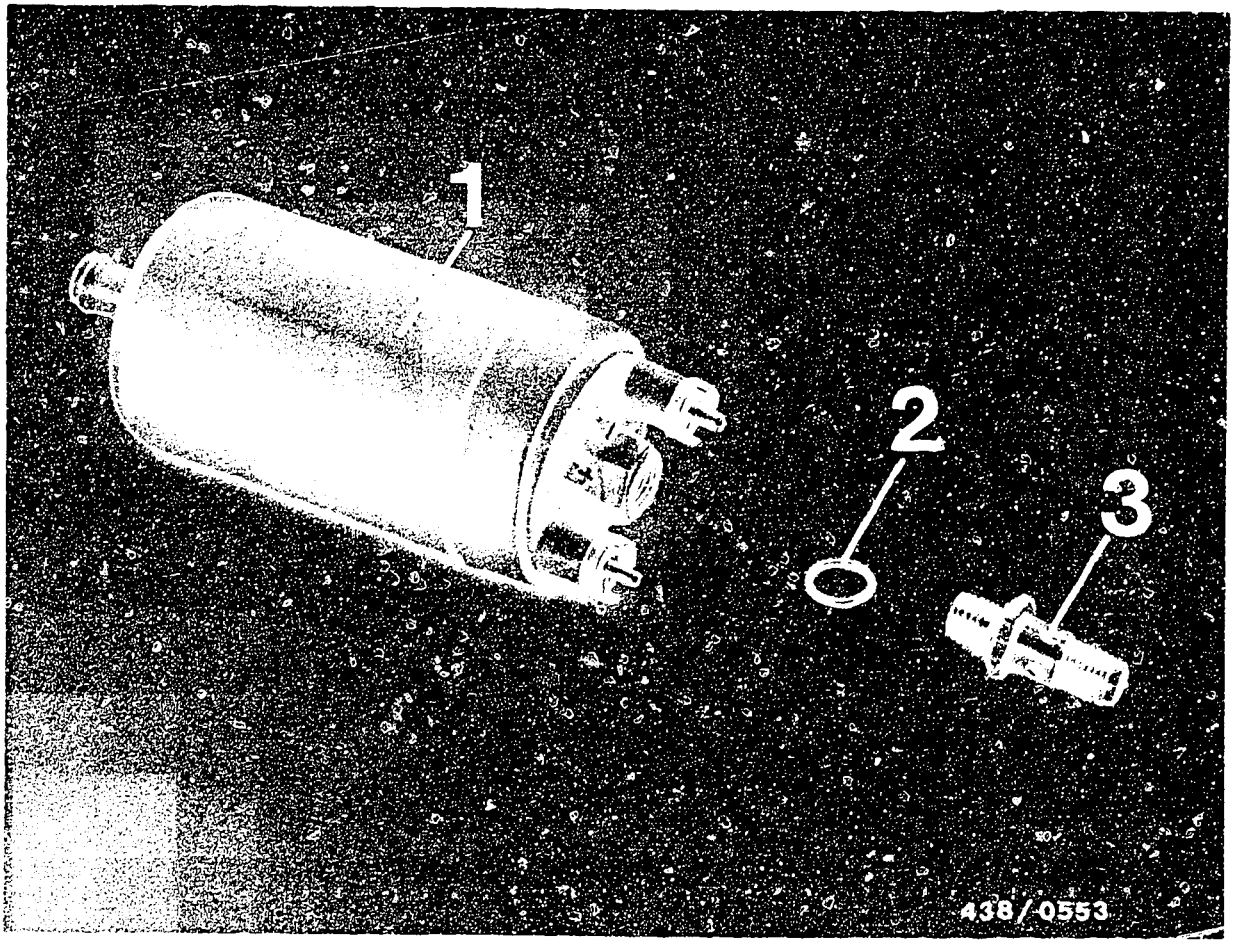
The test is performed with the engine switched off.
Make the test with a warm engine but not immediately after the engine has been operated at a high temperature.
Open the valve screw of the directional-control valve (both valves in the case of KDEP 1034).
Switch on the electric fuel pump by bridging the electrical safety circuit until the warm-up regulator has ceased to operate ("warm" control pressure).
Switch the electric fuel pump off again and observe the drop in pressure on the pressure gauge.



Test specifications for leak test:

Minimum pressure after:
10 minutes: 2.0 bar (2.1 kgf/cm²) gauge pressure
20 minutes: 1.7 bar (1.8 kgf/cm²) gauge pressure

If the pressure drops too quickly, repeat the test with the control-pressure circuit disconnected.
Position of the valve screws:
Close the valve screw of the directional-control valve KDJE-P 100.
In the case of KDEP 1034, close valve screw 1, open valve screw 3.
If the same result is found, the leak is in the primary-pressure circuit. If the test results are correct during the second test, the leak is in the control-pressure circuit.



1 = Electric fuel pump
2 = Flat seal ring
3 = Tube fitting

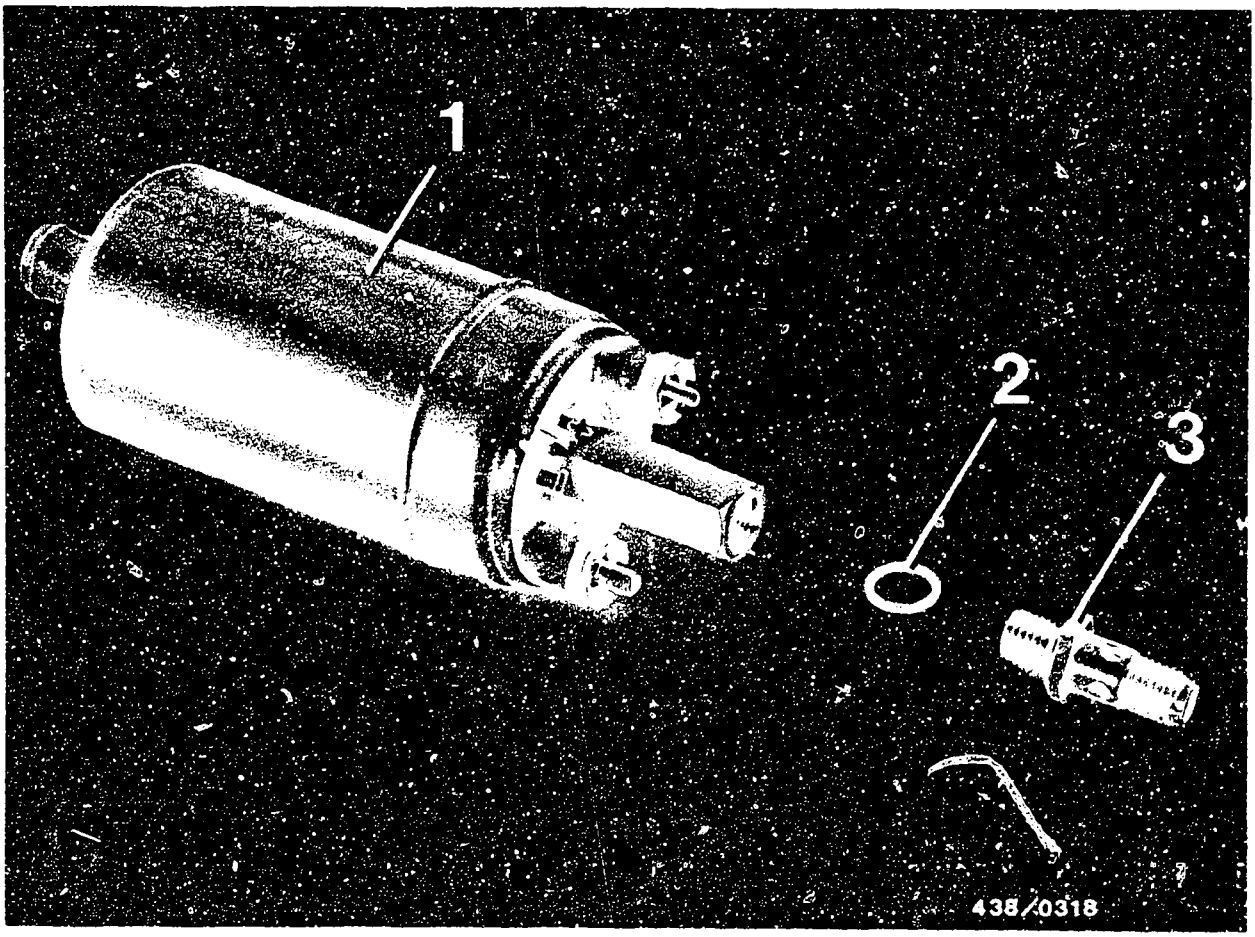
16.4 Possible causes of a defect in the primary-pressure circuit:

- Non-return valve in the pressure connection piece of the electric fuel pump has a leak.

Part No. of electric fuel pump: 0 580 254 980
The non-return valve is built into the tube fitting.
If necessary, replace the tube fitting,
Part No. 1 583 386 016, as follows:

Thoroughly clean the connection of the delivery line on the electric fuel pump.
Pinch off the intake hose (fuel tank - electric fuel pump) (e.g. using hose clamper W 157 from Matra Co.).
Screw off the delivery line, collecting any escaping fuel.
Screw out the defective tube fitting.

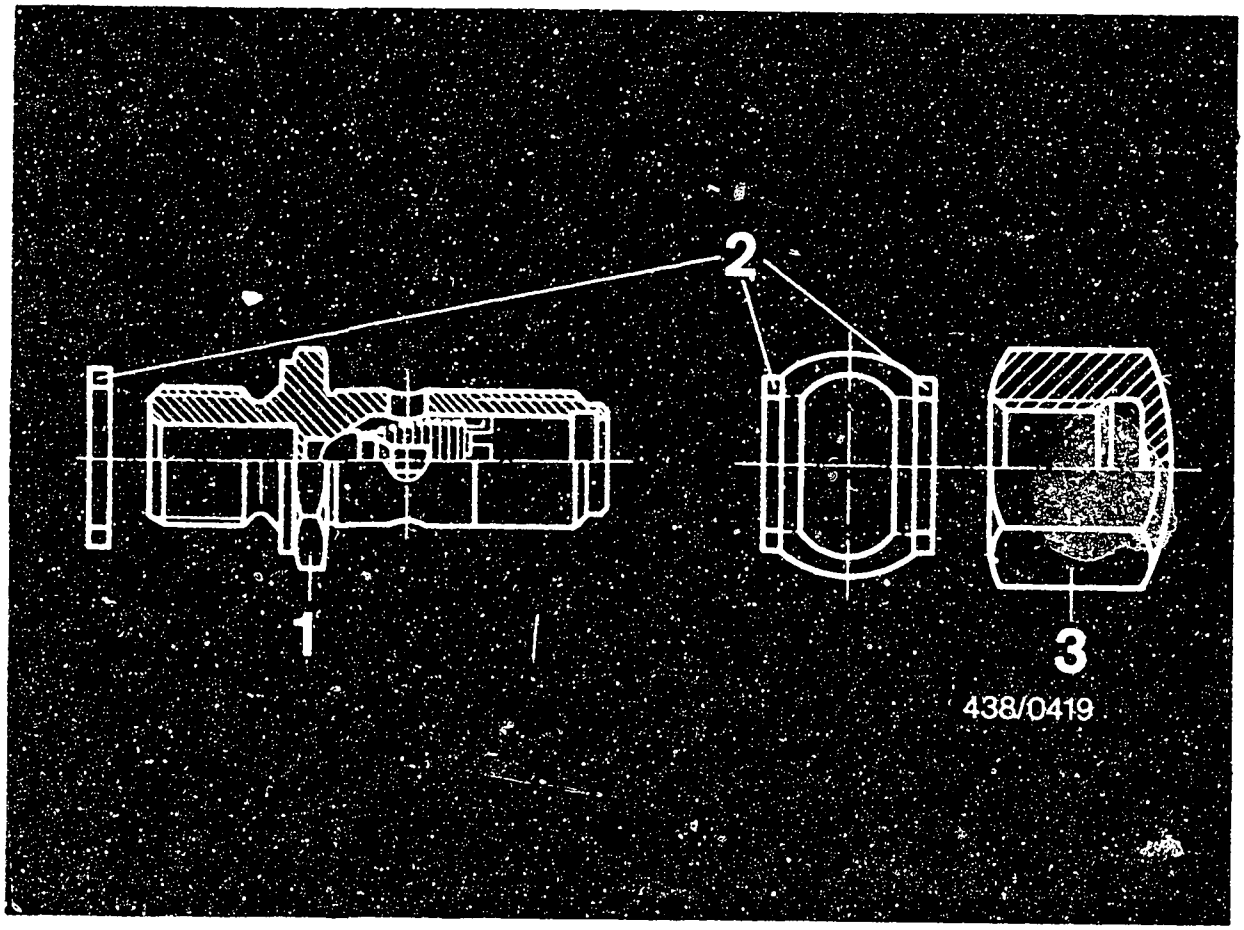
Screw a new tube fitting (short end) with thick flat seal ring into the pressure connection piece and tighten to a torque of 17...25 Nm while at the same time applying a wrench to the hexagonal section of the pressure connection piece.
Fit a thin flat seal ring, fuel-line inlet union and another flat seal ring onto the long end of the tube fitting and tighten with the hexagon cap nut.
Remove hose clamper from intake hose.
Check connections for leaks with the electric fuel pump in operation.



1 = Electric fuel pump
2 = Flat seal ring
3 = Tube fitting

- Non-return valve in the pressure connection piece of the electric fuel pump has a leak.

Part No. of electric fuel pump: 0 580 254 982 to FD 822
The non-return valve is built into the tube fitting and cannot be exchanged.
In order to avoid having to change the whole electric fuel pump in the case of a leaking non-return valve, a parts set has been produced with a separate non-return valve, which can be used on the above-mentioned electric fuel pump.
Part No. of parts set: 1 587 010 003.

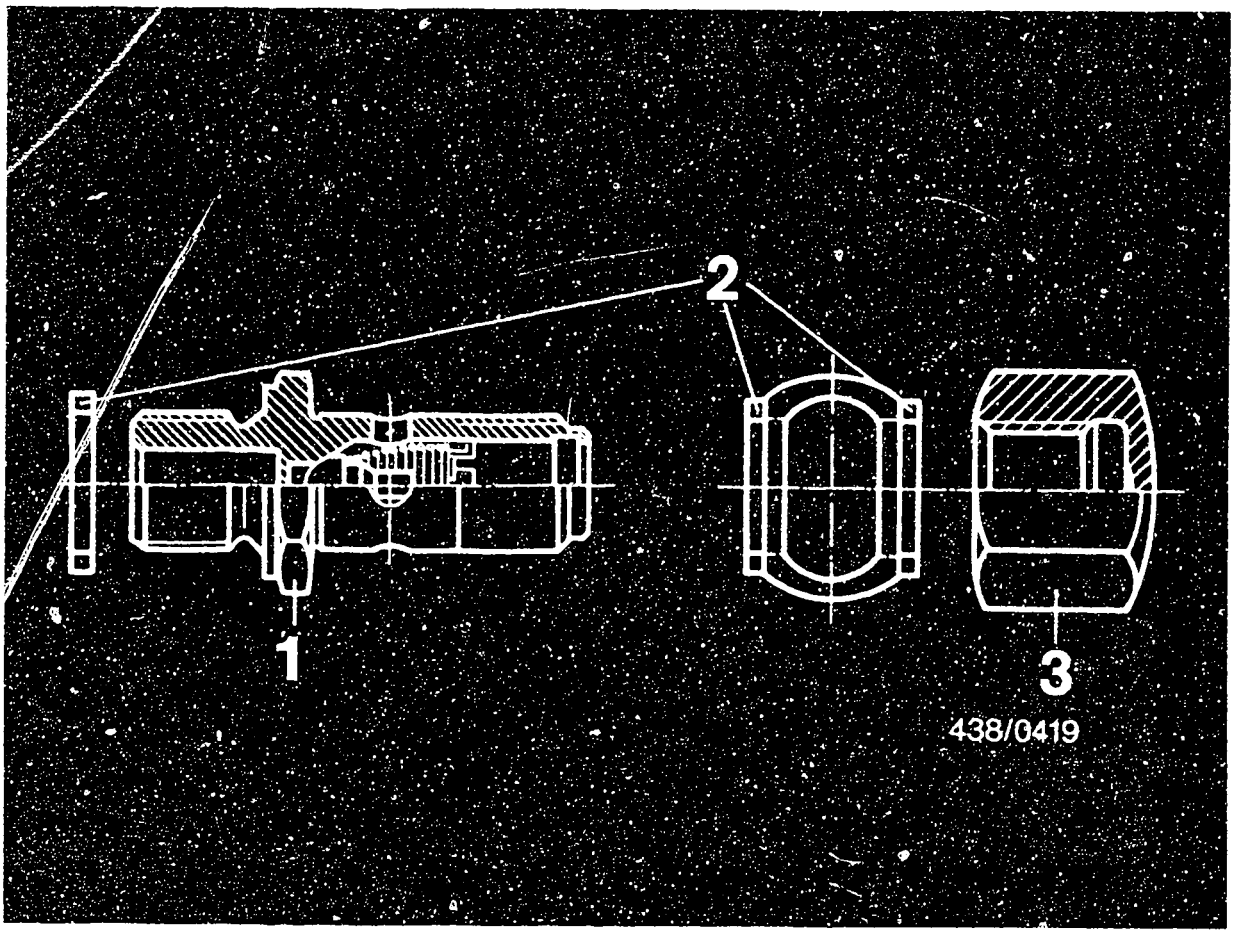


1 = Tube fitting with built-in non-return valve
2 = Flat seal rings
3 = Cap nut

Parts set: 1 587 010 003

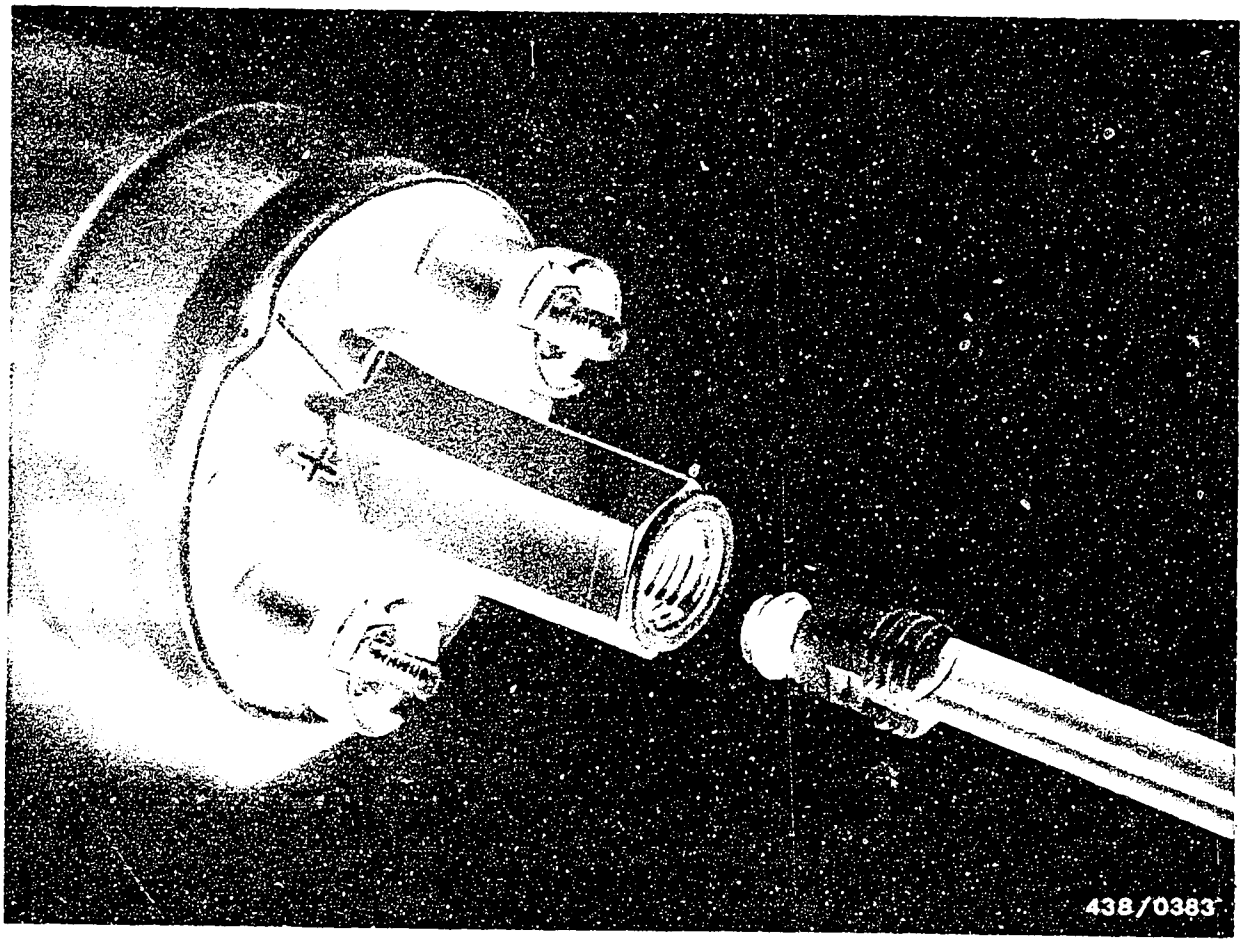
Installation:

Thoroughly clean the connection of the delivery line on the electric fuel pump.
Pinch off the intake hose (fuel tank - electric fuel pump) (e.g. using hose clamper W 157 from Matra Co.).
Screw off the delivery line, collecting any escaping fuel.



The defective original non-return valve remains in the electric fuel pump.

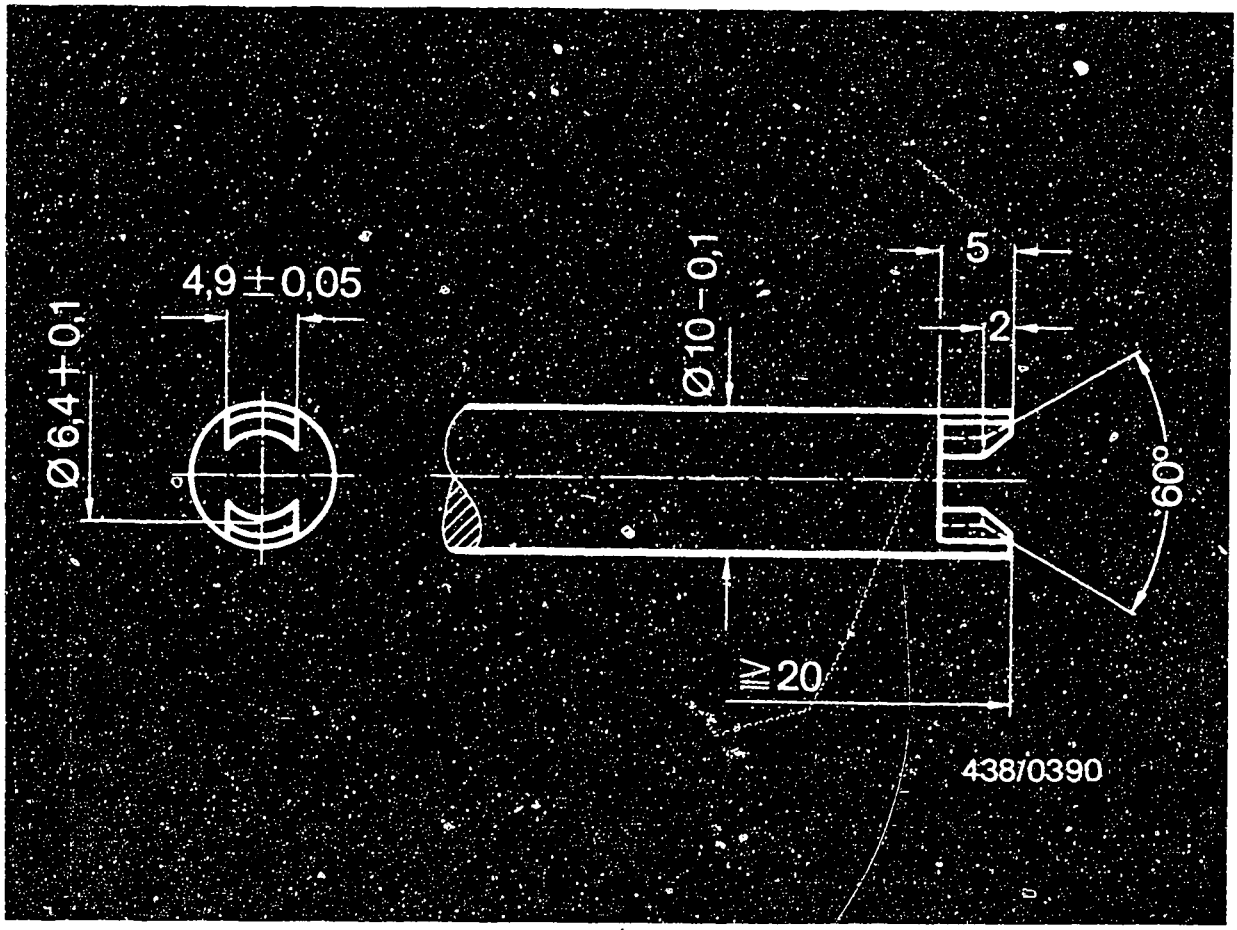
Screw a tube fitting of the parts set (short end) with thick flat seal ring into the pressure connection piece and tighten to a torque of 17...25 Nm.
At the same time apply a wrench to the hexagonal section of the pressure connection piece.
Fit a thin flat seal ring, fuel-line inlet union and another flat seal ring onto the long end of the tube fitting and tighten with the hexagon cap nut.
Remove hose clamper from intake hose.
Check connections for leaks with the electric fuel pump in operation.



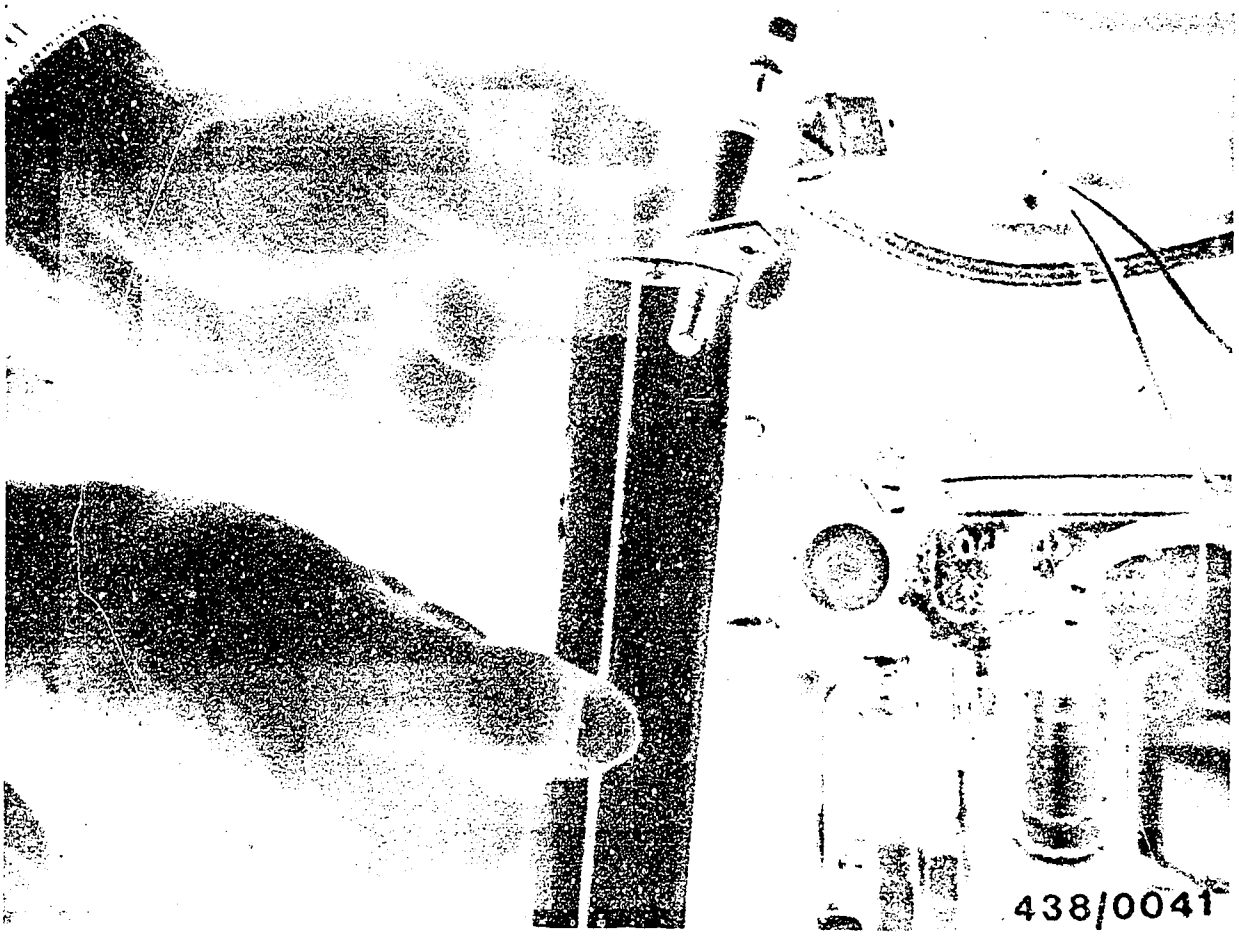
Electric fuel pump Part No. 0 580 254 982 from FD 823
The non-return valve is screwed into the pressure connection piece of the electric fuel pump.
In case of leaks, the whole valve insert should be replaced.
Part No. of the valve insert: 1 587 410 901.

Installation:

Thoroughly clean the connection of the delivery line on electric fuel pump.
Pinch off intake hose (fuel tank - electric fuel pump) (e.g. with hose clamper W 157 of Matra Co.). Screw off the delivery line, collecting any escaping fuel.



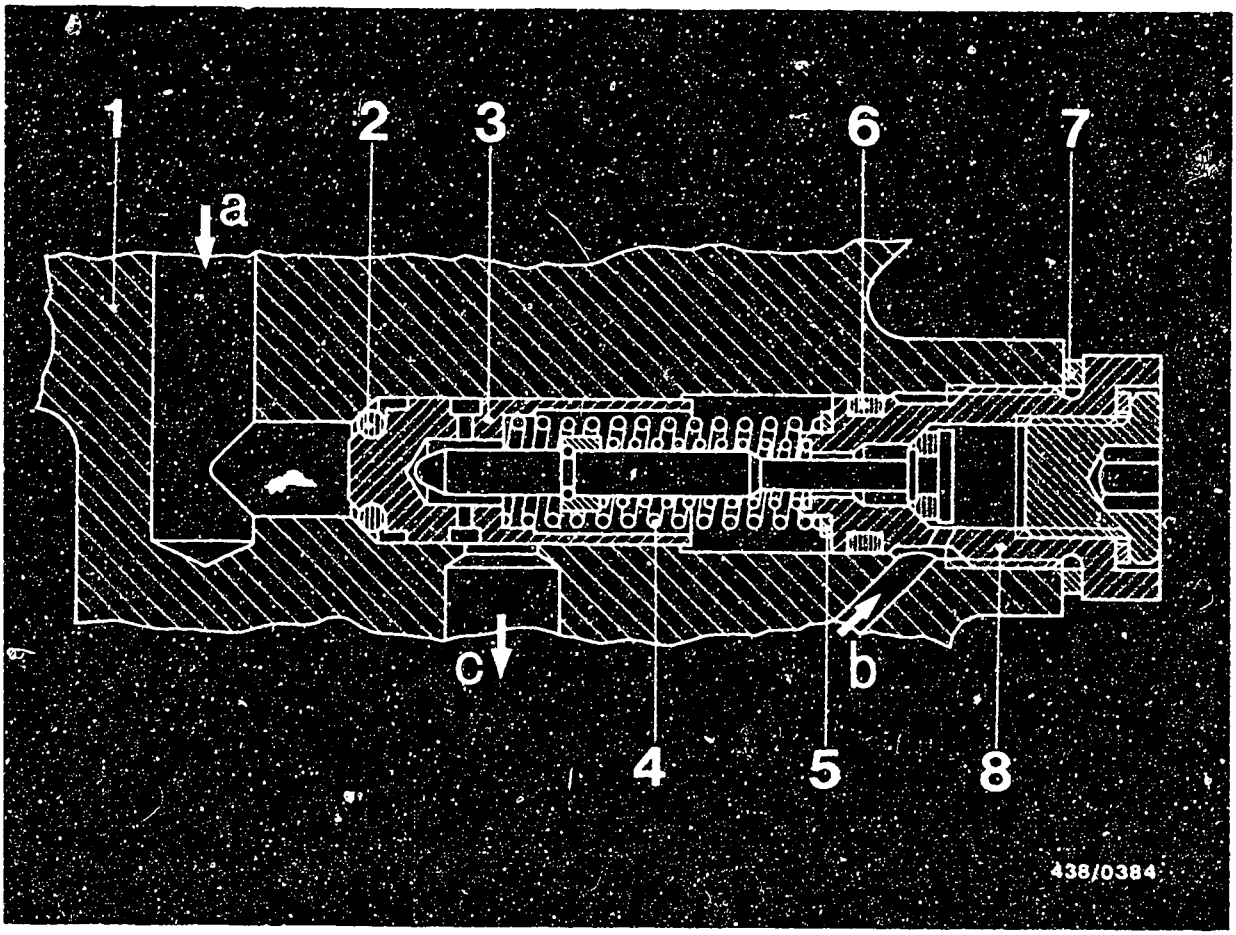
Unscrew valve insert with screwdriver for slotted shoulder screws (can, if necessary, be made by following sketch above).
Screw in new valve insert. Do not fasten too tightly.
Torque 0.4...0.6 Nm (4...6 kgfcm).
Connect delivery line with new flat seal rings and inlet union.
Remove hose clamper from intake hose.
Check connections for leaks with the electric fuel pump in operation.



• The cold-start valve has a leak

Remove cold-start valve. Hose line remains connected.

Hold start valve in a suitable container (e.g. graduate).
Switch on the electric fuel pump by bridging the electrical safety circuit.
Dry off the nozzle of the cold-start valve.
No drops must fall from the nozzle of the start valve within the next minute. Even when shaken and knocked, the start valve must not leak.
Switch the electric fuel pump off again.
Replace the cold-start valve, if leaky.
Finally, adjust idle-speed with the engine at operating temperature. See Coordinates F 12.



- Seal ring on control piston of primary pressure regulator has a leak.

Replace seal ring:

Clean the fuel distributor in the region of the primary-pressure regulator.

Screw out the large screw plug (8) with the complete push valve. Also remove shims (5), control spring (4) and control piston (3).

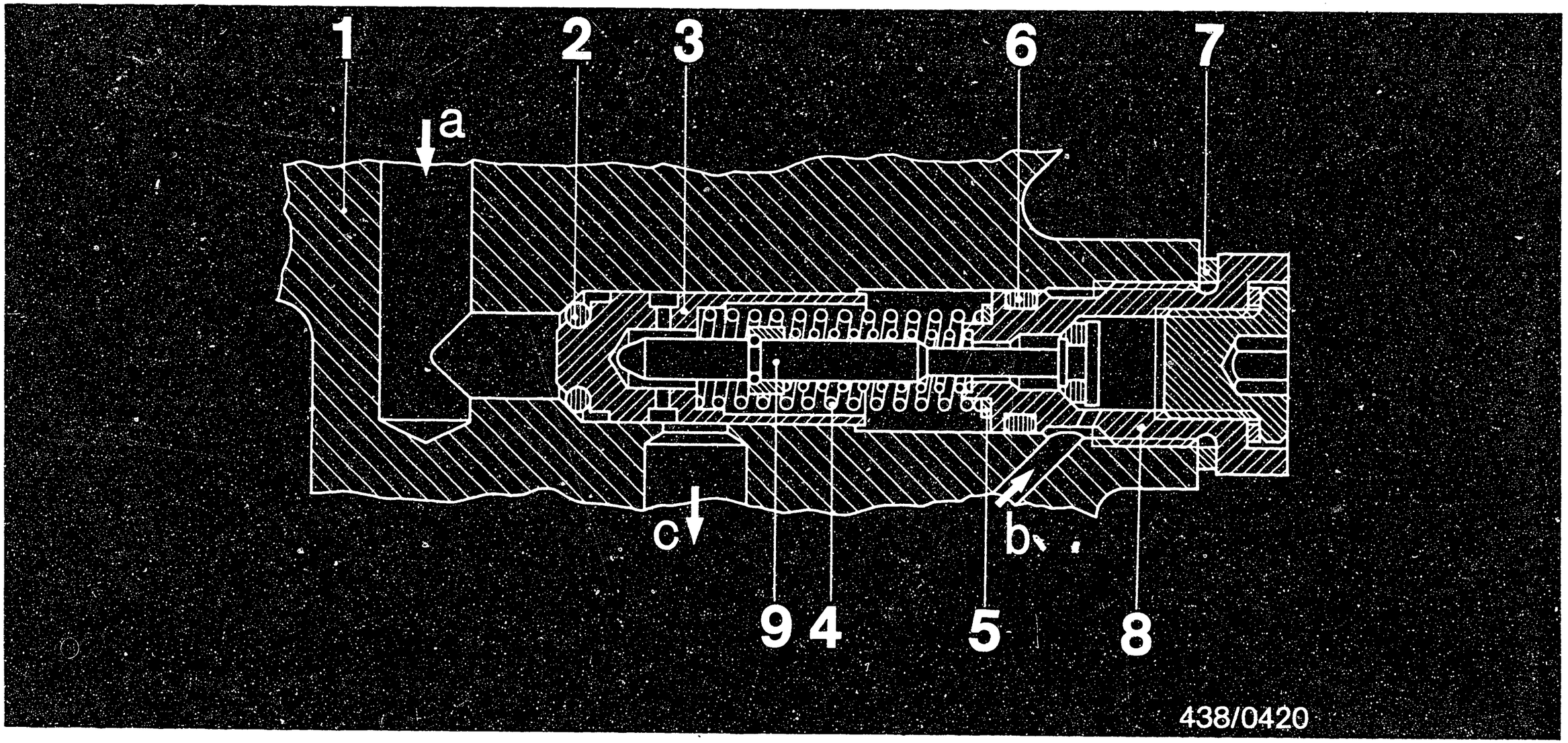
Change O-ring (Item 2), fit control piston and control spring. Screw in screw plug (8) with complete push valve and with shims (as when removed) and new seal rings (6 and 7).

Finally, check the primary pressure and if necessary, adjust by changing the shims.

Primary pressure, test and setting values (gauge pressure)

Fuel distributor Part No.: 0 438 100 028
0 438 100 108

Test value: 4.5...5.2 bar (4.6...5.3 kgf/cm²)
Setting value: 4.7...4.9 bar (4.8...5.0 kgf/cm²)



a = Primary pressure
b = From warm-up regulator
c = Fuel return

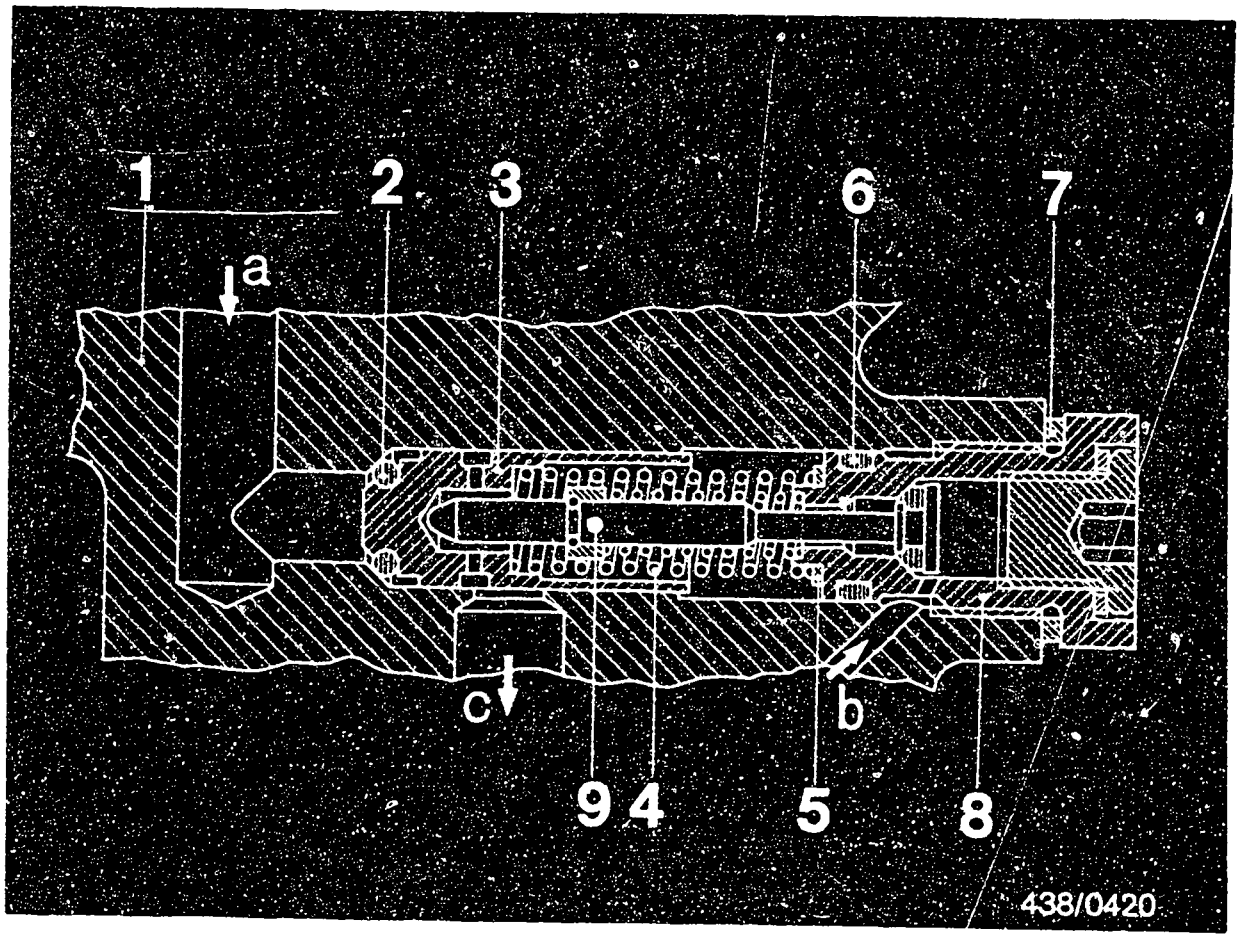
1 = Fuel-distributor housing
2 = O-ring
3 = Control piston

4 = Control spring
5 = Shim(s)
6 = O-ring

7 = Flat seal ring
8 = Screw plug
9 = Push valve

16.5 Possible causes of a defect in the control-pressure circuit:

The push valve (9) in the primary-pressure regulator has a leak.
Since the seal ring of the push valve is rigidly vulcanized onto the valve needle, the whole push valve (ready-assembled unit) must be changed.



a = Primary pressure
b = From warm-up regulator
c = Fuel return
1 = Fuel distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = O-ring
7 = Flat seal ring
8 = Screw plug
9 = Push valve

Clean the fuel distributor in the region of the primary-pressure regulator. Screw out the large screw plug (8) together with the complete push valve. Pay attention to control spring (4) and shims (5).
Screw in new push valve using the number of shims (5) as when removed, new O-ring (6) and flat seal ring (7).
Finally, check the primary pressure and, if necessary, adjust by changing the shims (5).

Primary pressure, test and setting values (gauge pressure)

Fuel distributor Part No. 0 438 100 028
0 438 100 108

Checking value: 4.5...5.2 bar (4.6...5.3 kgf/cm²)
Setting value : 4.7...4.9 bar (4.8...5.0 kgf/cm²)

17. Testing the injection valves

Remove the injection valves for testing.
When loosening the fuel lines, apply counter-force at the fixed hexagon of the injection valves.
When refitting the injection valves, it is best to replace the O-rings on the valve stem (BMW service part) in order to prevent leaks and thus the entry of unmetered air.

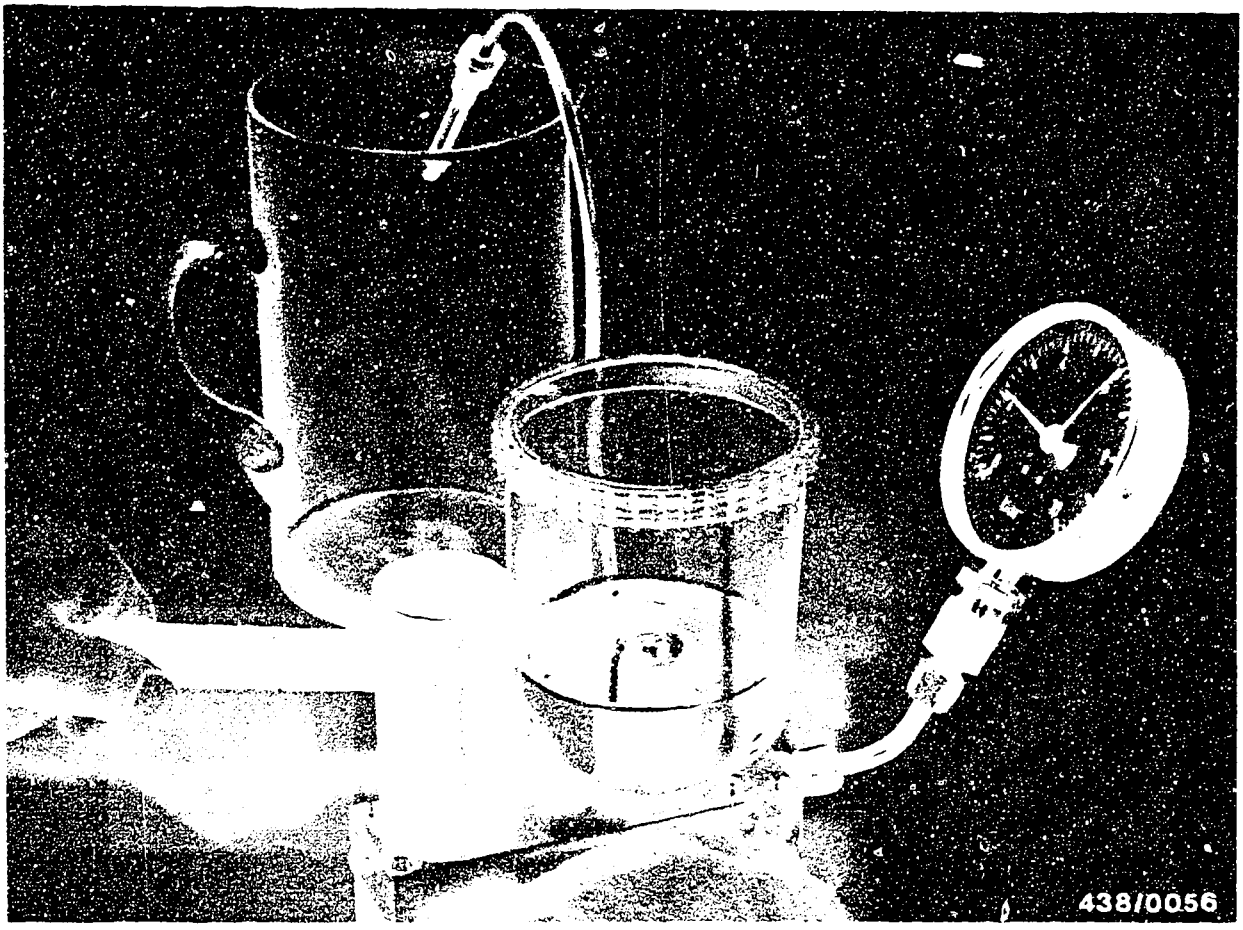
17.1 Test equipment and test media

The following testing specification refers to valve testers KDJE-P 400 (previously KDEP 7452) and 0 681 200 700.

Observe the test-media specification!

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135)
or
Bosch Part No. VS 14 942-CH
Former Part No. 5 973 340 650
The calibrating fluid can be obtained in 5 l metal cans from the following supplier:
Firma
Oskar Gnamm GmbH & Co
D-7531 Kämpfelbach-Bilfingen

Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids.
Even with calibrating fluid, be sure to observe the local official regulations.

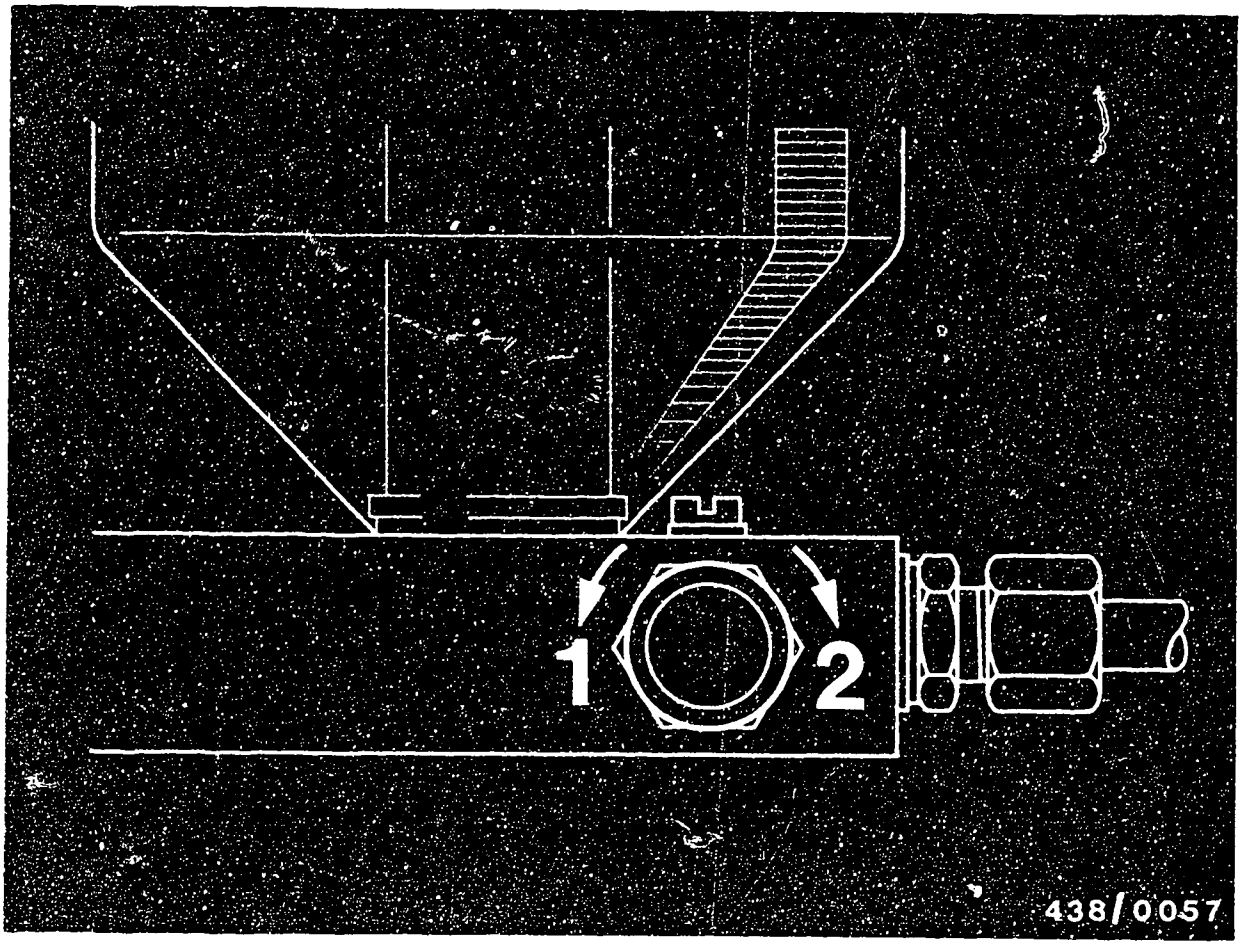


17.2 Connecting the injection valve to the tester

Connect injection valve to valve tester and bleed the discharge tubing by moving the lever back and forth several times with the union nut open. Then tighten the union nut.

17.3 Checking for dirt

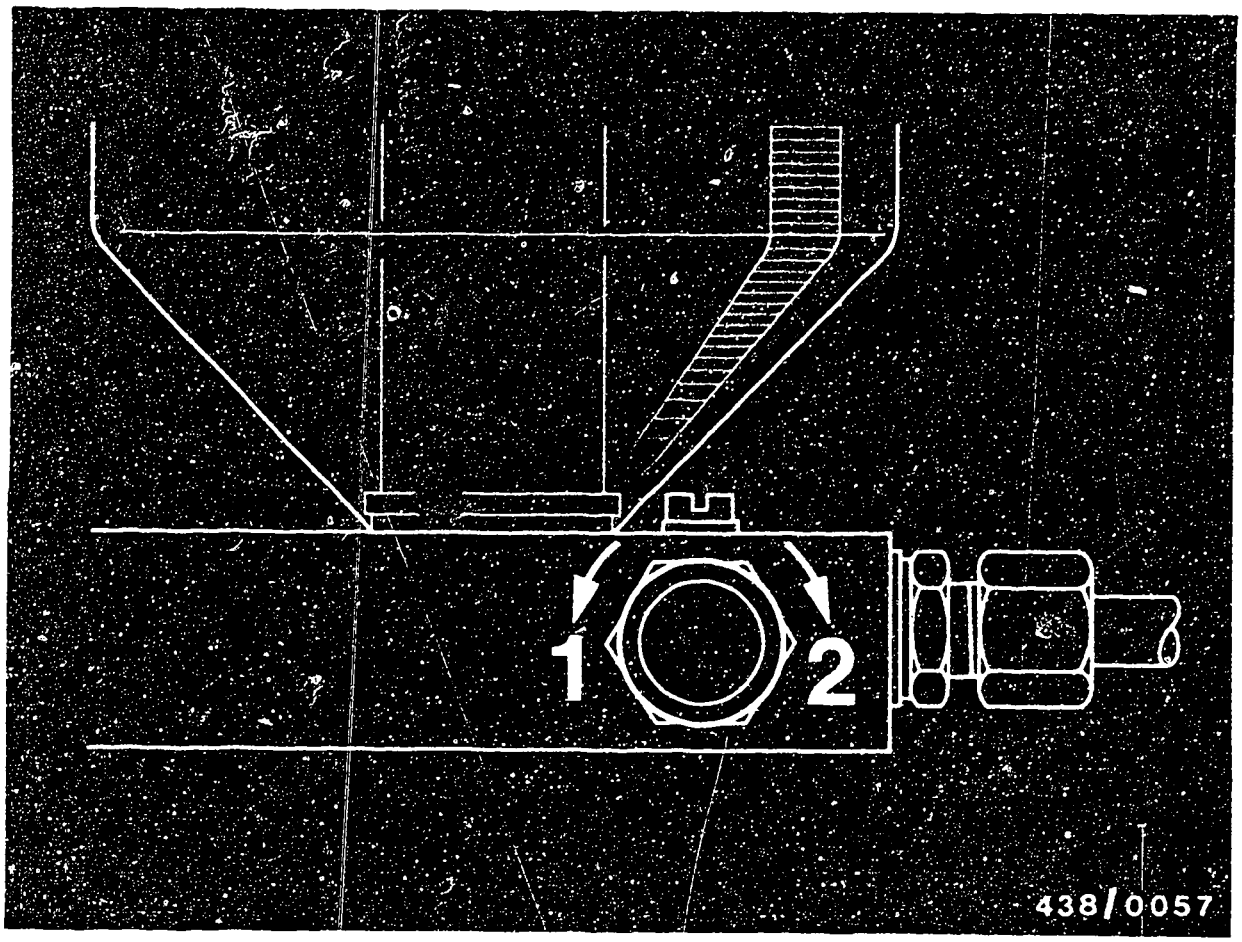
Move the hand lever slowly (about 2 seconds per stroke) back and forth with the stopcock on the pressure gauge open. If the pressure does not build up to 1...1.5 bar gauge pressure, the injection valve has a bad leak (caused, for example, by dirt stuck in it).
You can try to flush the injection valve clear by moving the lever back and forth several times strongly. If this attempt is successful continue the test. If it is not possible to flush the valve clear, replace it.



1 = Open 2 = Close

17.4 Testing the opening pressure

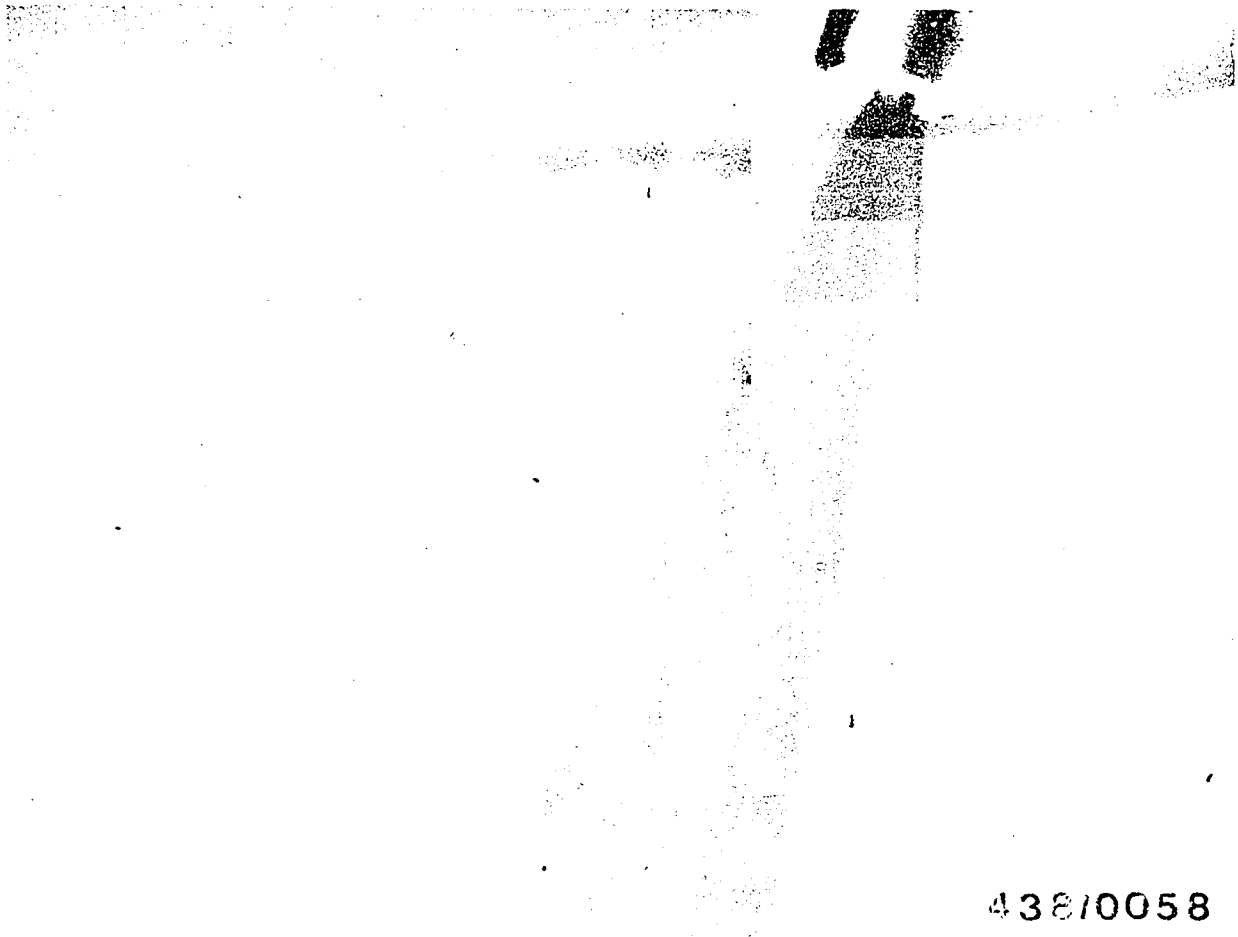
Test specifications - opening pressure:
Part No.: 0 437 502 006
Opening pressure = 2.7...3.8 bar (2.8...3.9 kgf/cm²) (gauge pressure).
With the stopcock closed, flush the valve out and bleed it with several rapid movements of the lever.
Open the stopcock and test the opening pressure by moving the lever slowly (about 2 seconds per stroke).
If the opening pressure is outside tolerance, replace the injection valve. Individual valves can also be interchanged within a set.



1 = Open 2 = Close

17.5 Leakage test

Open the stopcock, build the pressure up slowly to a value 0.5 bar under the opening pressure determined previously (but not less than 2.5 bar gauge pressure), and hold it constant at that level. No drops must now fall from the valve for the next 15 seconds.



438/0058

17.6 Chatter test, evaluation of spray

Move the lever back and forth at about 1 stroke per second. As this is done, the valve must chatter. No drops of fuel must form at the mouth of the valve. The valve must not produce a "cord spray". Formation of a single-sided, atomized spray within an overall spray angle of about 35° is permissible (see example given in illustrations).

Illustration shows good spray formation.

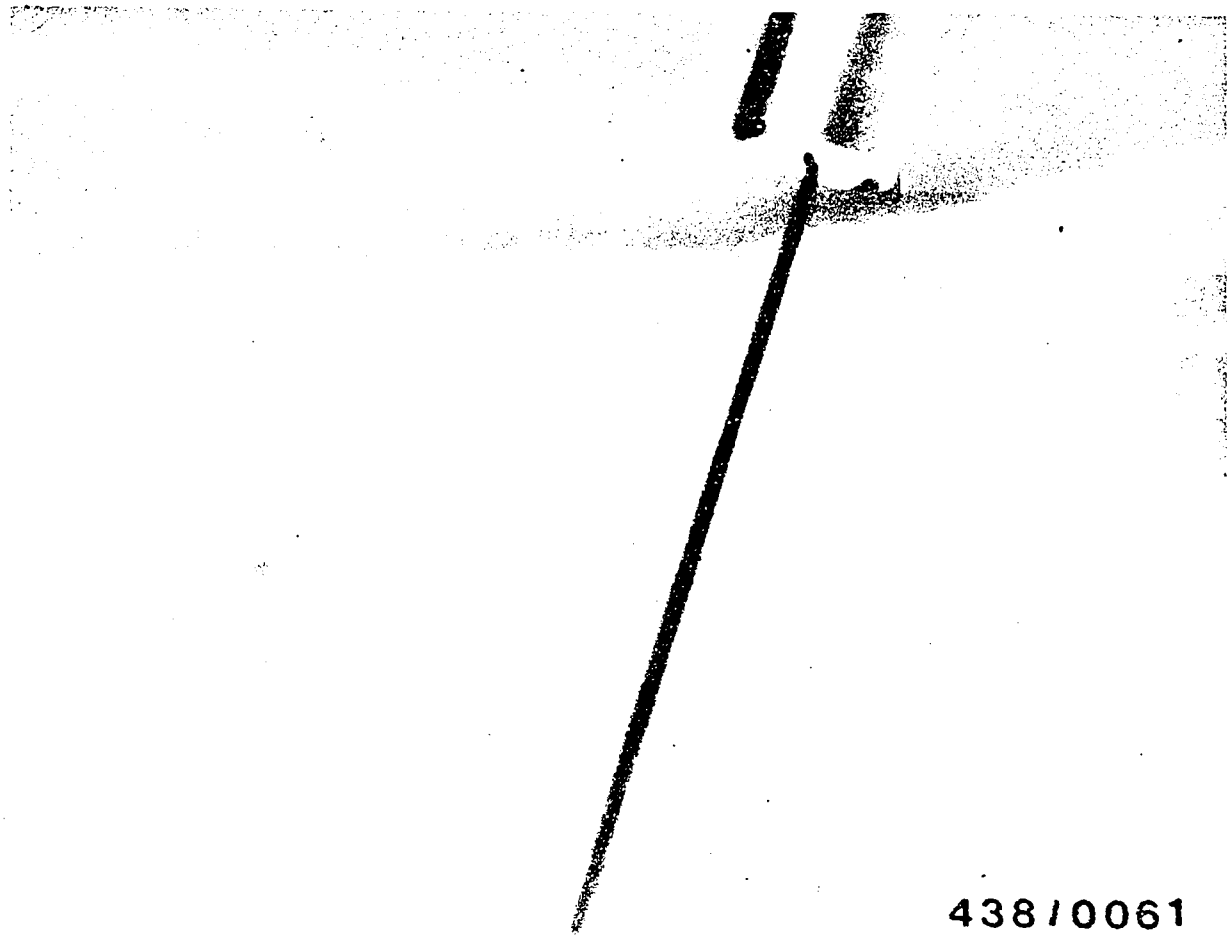
438/0059

Illustration shows single-sided but nevertheless good spray formation.

438/0060

Poor spray formation; replace injection valves.

Illustration shows drop formation.



438/0061

Poor spray formation; replace injection valves.

Illustration shows "cord" spray.

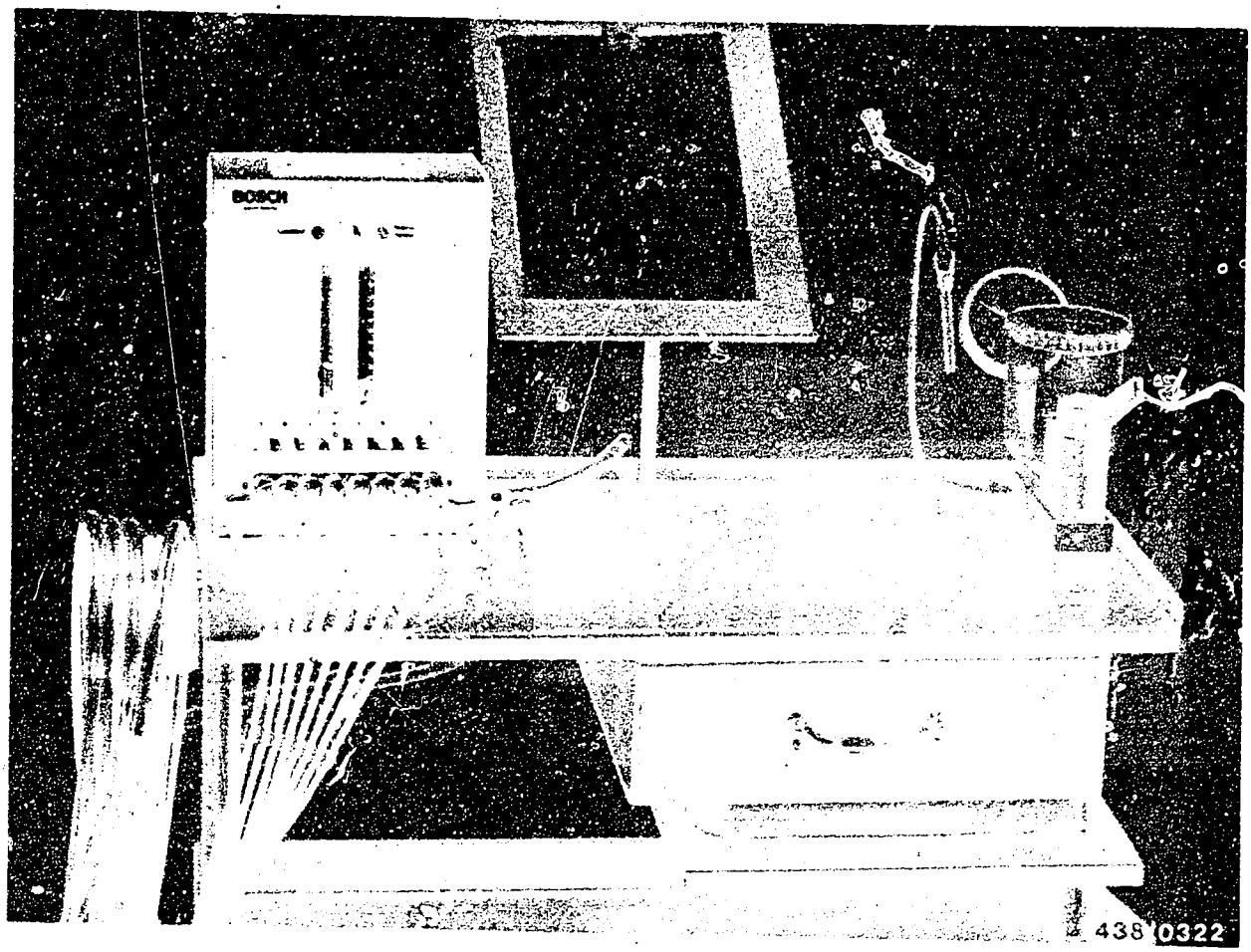
438/0062

Poor spray formation; replace injection valves.

Illustration shows "spray in strands".

If defective injection valves have been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 12.

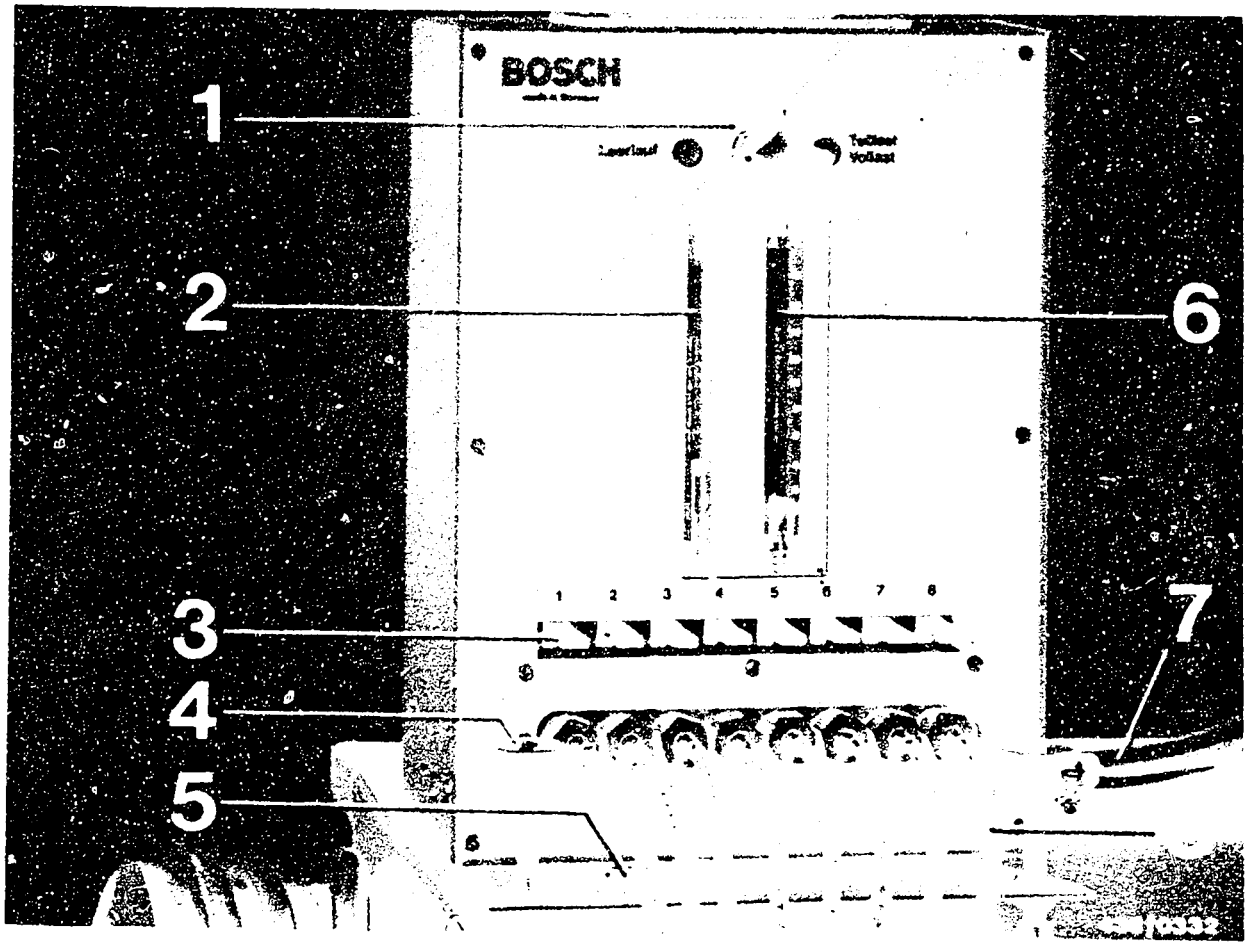


18. Comparative measurement of fuel delivery of fuel distributor outlets.

This test is carried out using the tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).

18.1 Application

By means of comparative measurements, the differences in the amounts of fuel delivered from the individual outlets on the fuel distributor are determined.
The tester is designed so that the test can be made on the vehicle without having to remove the fuel distributor.
Since the test is made with the original injection valves, the operator can recognize at the same time whether delivered-quantity scatter, if it occurs, is caused by the fuel distributor or by the injection valves.



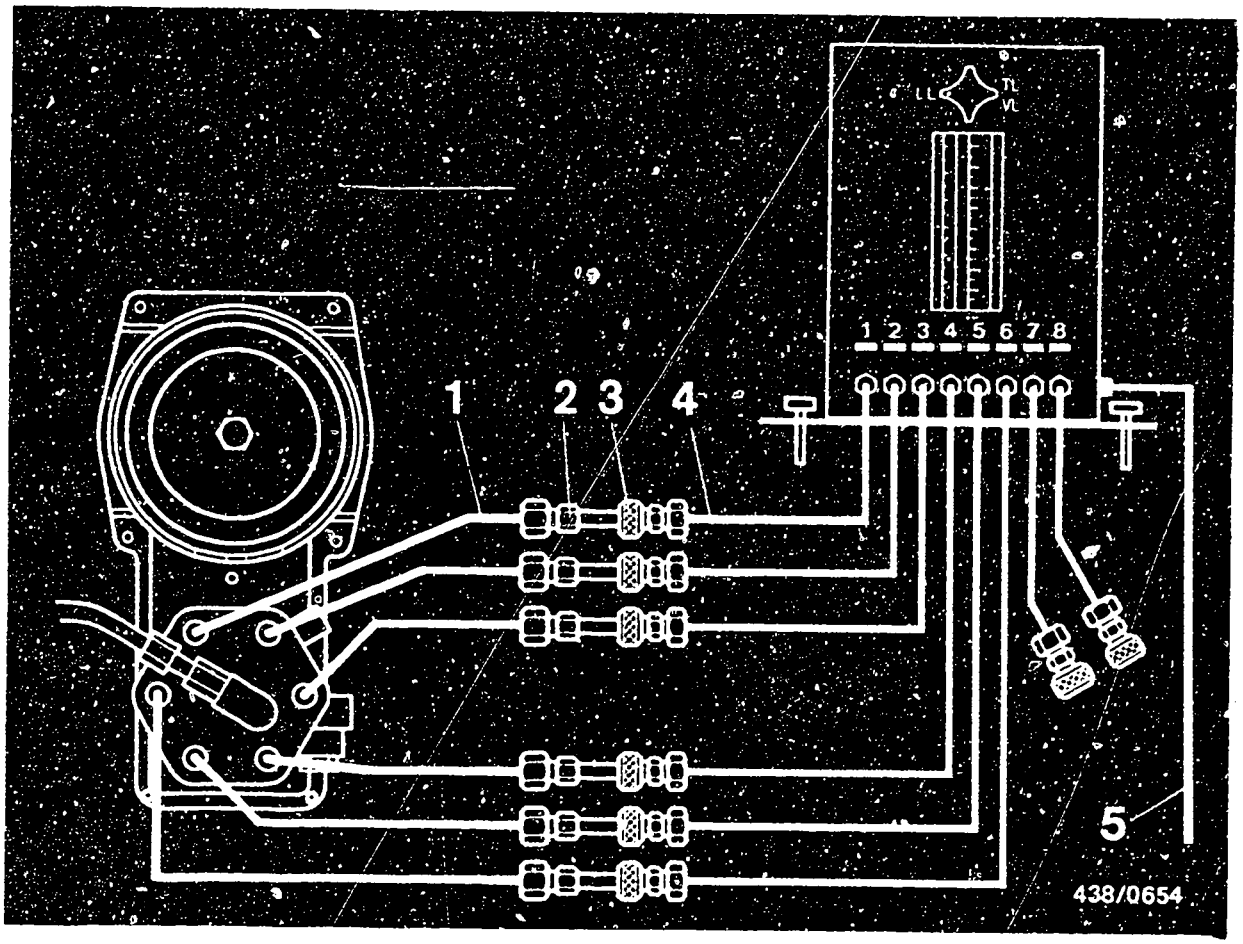
1 = 3-way cock
2 = Small rotameter tube
3 = Keyboard for 8-way valve
4 = Adjusting screw for setting up
5 = Spirit level
6 = Large rotameter tube
7 = Return hose
8 = Polyamide hose lines (test lines)

18.2 Construction

The tester is designed for use with all engines, up to 8 cylinders, equipped with K-Jetronic.

Basically, the tester consists of a steel housing containing 2 rotameter tubes with measuring ranges of 2... 15 cm^3 and 10...180 cm^3, an 8-way valve for key operation (3) and a 3-way stopcock (1).
The small rotameter tube (2) is used for the idle measurement while the large tube (6) is used to measure the fuel delivery at part- and full-load. The particular rotameter tube to be used is connected by means of the 3-way stopcock. Using the 8-way valve, the fuel delivery of each cylinder is tested one after the other.

Attached to the tester are 8 hoses (8), each terminated with an automatic connector. When the injection valves are withdrawn from their sockets on the engine they are attached to these connectors. Each automatic connector is fitted with a push valve so that no fuel can escape from connectors that are not in use (when 4- or 6-cylinder systems are tested).
The fuel is returned to the fuel tank through a hose (7) about 5 m long.
The entire test is made with a closed circuit, i.e. no fuel escapes.



1 = Fuel-injection tubing of fuel distributor
2 = Injection valves
3 = Automatic connectors
4 = Tester hoses
5 = Return line to fuel tank filler neck

18.3 Setting up and connecting the tester:

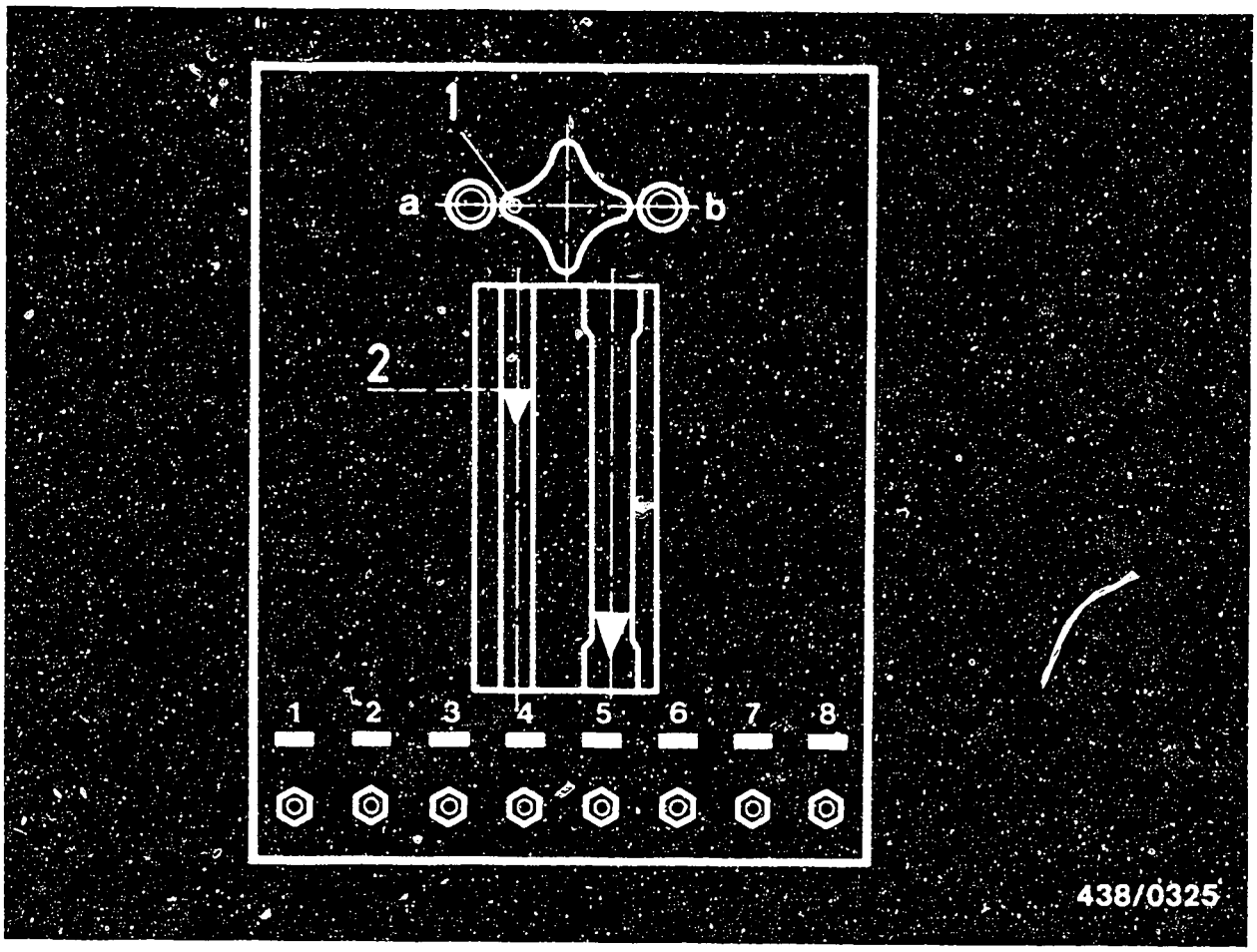
Set the tester up beside the vehicle on a solid base (e.g. on tester trolley KDJE-W 100) and align it with the built-in spirit level (water lever at base of the tester).

Remove injection valves; the injection tubing remains connected.
Clean the injection valves with a rag and insert injection valves in correct sequence into the automatic connectors of the first four tester hoses.

Note:
Insert the injection valves as far as they will go and tighten the knurled thumbscrews well so that the non-return valves of the automatic connectors are open fully.
Introduce the return hose of the tester into the fuel tank filler neck.

18.4 Bleeding the tester:

Remove the rubber hood so that air-flow sensor plate becomes accessible.
Remove the electric plugs from the warm-up regulator and the auxiliary-air device.
Switch on the electric fuel pump by bridging the electrical safety circuit.
Raise the air-flow sensor plate to the stop.
Press the keys on the 8-way valve one after the other, while simultaneously switching the 3-way stopcock until both rotameter tubes are bled.
Return the sensor plate to the rest position.

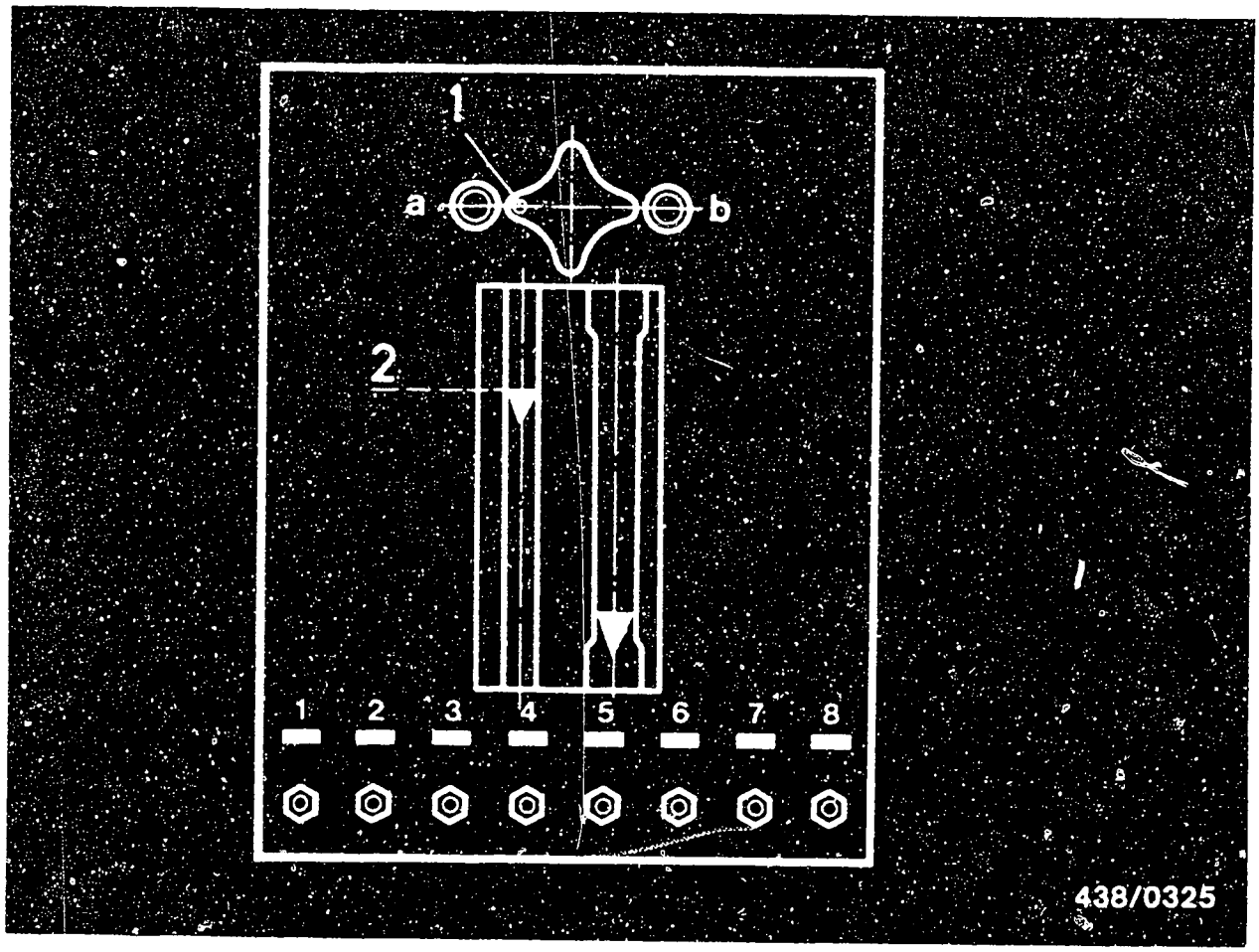


1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

18.5 Testing

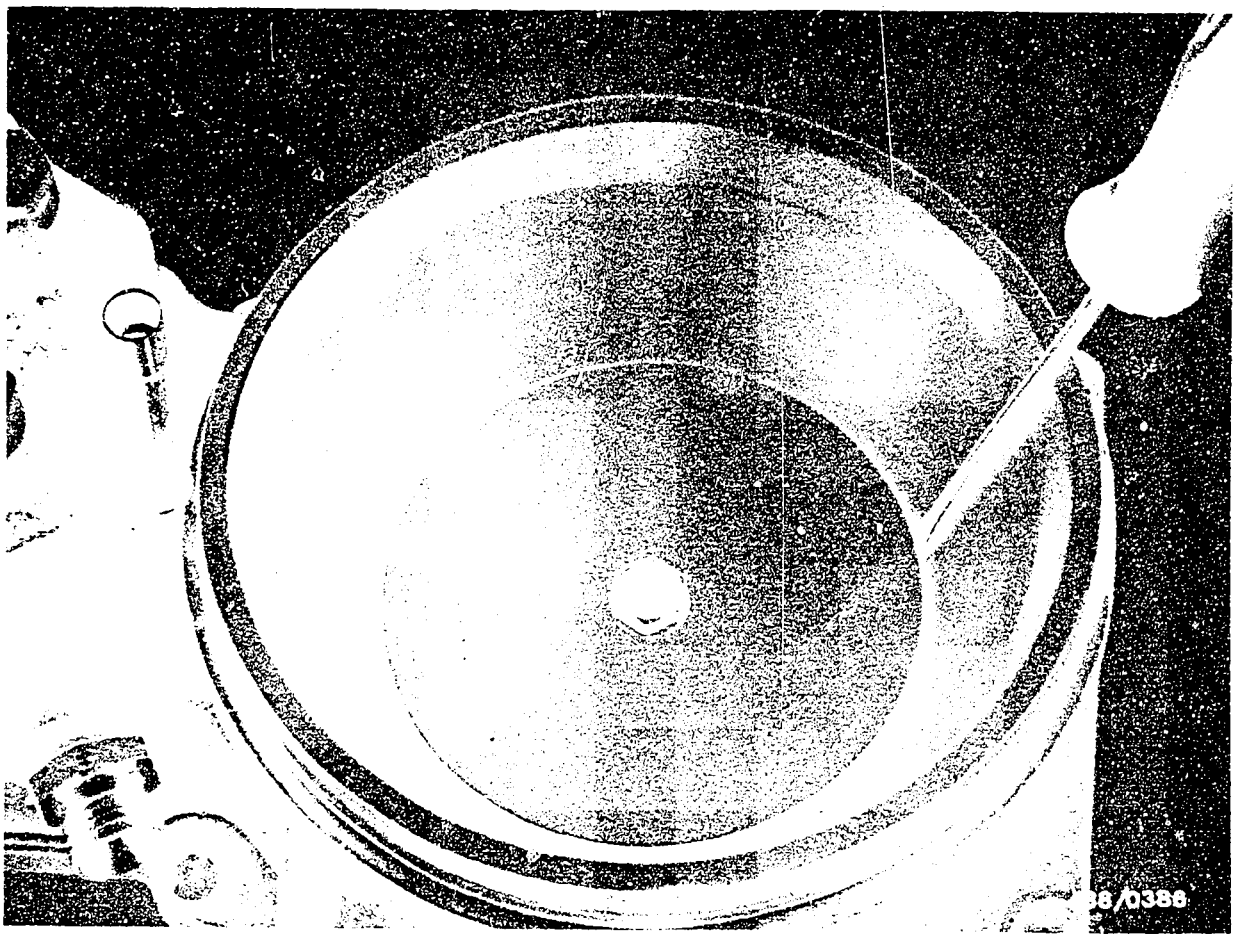
The flow comparison measurement is made in the idle, part-load and full-load ranges.
The small rotameter tube is to be used for the idle measurement (white dot to left on control knob); part-load and full-load measurements are made using the large rotameter tube (white dot to right).



1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

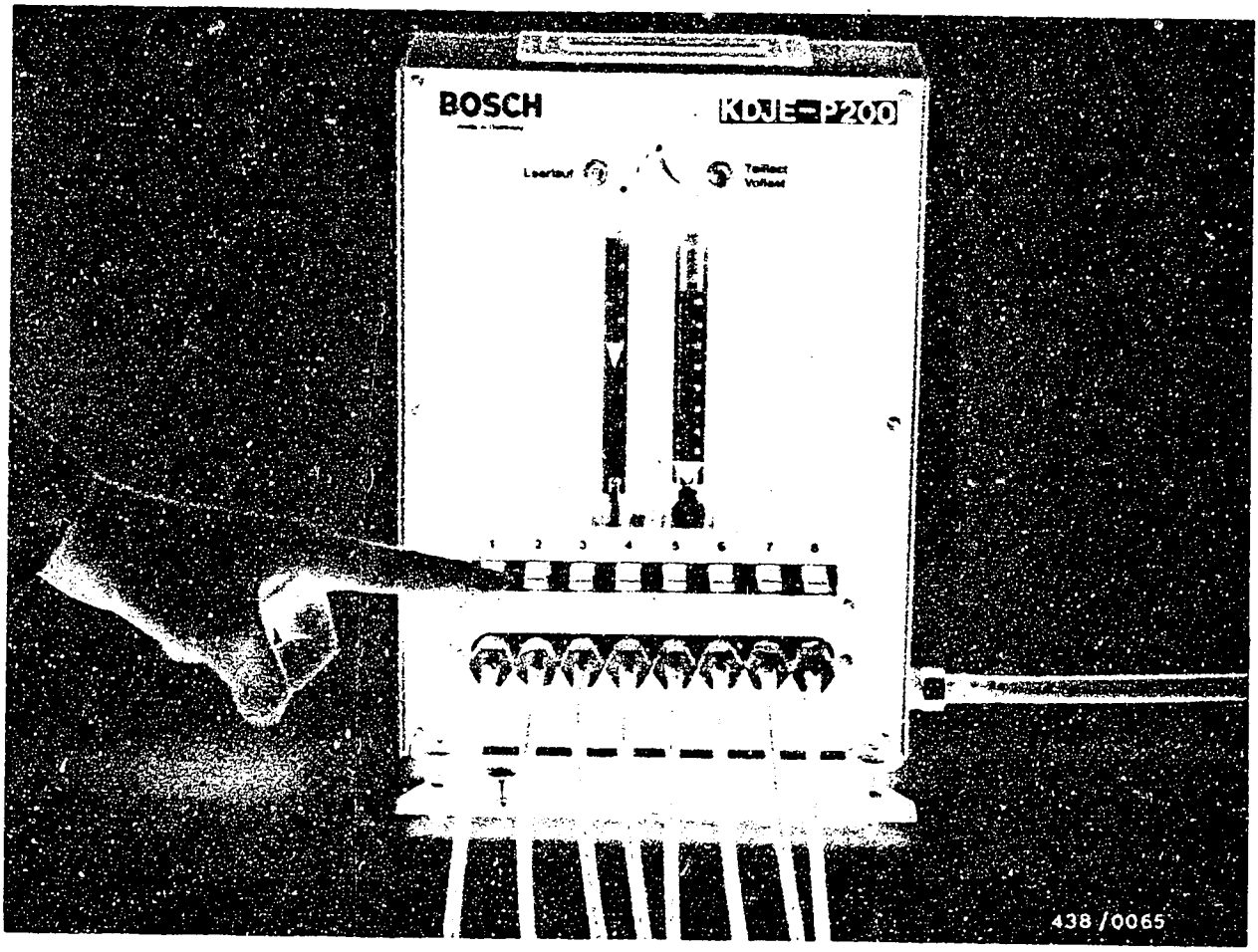
The delivered quantities indicated on the rotameter tubes are read off at the top edge of the conical float (Item 2). On testers with a ball float the uppermost point of the ball is used for reading off. With each measurement be sure to wait until the float has reached its final position. This make take 20...30 seconds in the case of small deliveries.



The exact setting and locating of the position of the air-flow sensor plate for the various load ranges is done using a screwdriver (a small one for the idle-position), which is inserted to an appropriate depth between the air funnel and air-flow sensor plate.

Procedure:

Switch on the electric fuel pump by bridging the electrical safety circuit.
Fixed numerical values are specified in the following test section for the maximum permissible fuel delivery differences for the individual load ranges.
The "set point" value always pertains to the fuel-distributor outlet with the lowest fuel delivery, i.e. in each case the outlet with the lowest delivery is to be first ascertained.



Press the key for outlet 1. Pivot the air-flow sensor plate until the corresponding rotameter tube approximately indicates the "set point" value. Fix the air-flow sensor plate in this position.

Test the remaining outlets in order to determine which outlet has the lowest fuel delivery.

Press the key for this outlet again, and set the delivery precisely to the "set point" by correcting the position of the air-flow sensor plate. Then fix the air-flow sensor plate in this position again.

Press the remaining keys one after the other, and determine the maximum fuel delivery of each outlet. A deviation in fuel delivery can only be above the "set point".

18.6 Test specifications

Fuel distributor No. 0 438 100 028	Set point (cm^3/min)	Max. permissible fuel delivery (cm^3/min)
Idle	6.0	6.8
Part load	40.0	43.0
Full load	145.0	160.0

Fuel distributor No. 0 438 100 108	Set point (cm^3/min)	Max. permissible fuel delivery (cm^3/min)
Idle	6.0	6.7
Part load	40.0	43.0
Full load	120.0	131.0

If, in testing, too large a difference is ascertained in one of the three load ranges, the test should for safety's sake be repeated.

If the result is confirmed, you should check whether the fault lies in the fuel distributor or in the injection valves.

To do this interchange the injection valves with the greatest and smallest difference.
If the result is still the same, the fault is in the fuel distributor. If the fault follows the interchanged injection valves, it lies in the injection valves.
Change defective fuel distributor and/or replace defective injection valves.

18.7 Final operations

Re-fit the injection valves properly. Also fit the air filter. Make sure that all lines are laid correctly.
Re-connect the electrical safety circuit of the K-Jetronic properly.
Use a trial run to check that there are no leaks in line connections.
Finally check the idle-speed adjustment; if necessary, correct (Coordinates F 12).

19. Idle adjustment

19.1 Test conditions:

Warm up the engine for the idle adjustment (oil temperature approx. 80°C).

Important:

If fuel-injection lines or injection valves have been loosened or removed, warm up the engine under load. The low fuel throughput at idle is not always sufficient to bleed the fuel-injection lines.
The idle adjustment must not be carried out when the engine is too hot, e.g. immediately after the engine has been raced or after a power measurement on the roller-type test stand.

In vehicles with an air conditioner, switch the air conditioner off when performing the idle adjustment in order to stabilize the engine speed. The solenoid-operated air valve must not leak.
The vacuum limiter (in vehicles of the Sweden version) must not leak.

Check whether the throttle-valve lever is up against the idle stop. The cable must be adjusted free of tension.
The throttle-valve positioner (only in 520i vehicles) must not press on the throttle-valve lever.

Measure the engine speed with a separate tachometer.

19.2 Checking the solenoid-operated air valve (Only in vehicles with air conditioner)

The solenoid-operated air valve is connected as a bypass to the throttle valve. When the air conditioner is switched on the solenoid-operated air valve opens. In all other operating conditions the valve must be tightly closed.

A leak test can be performed as follows:
Measure the idle speed (engine at normal operating temperature, air conditioner switched off). Then switch off the engine.

Remove both hoses from the solenoid-operated air valve and seal off tight. Start the engine again and measure the idle speed. It must not differ from the previous measurement. If the engine speed has dropped, the solenoid-operated air valve has a leak. If it is leaking badly, the idle speed is too high and can no longer be adjusted.

Replace the solenoid-operated air valve if leaking.

19.3 Checking the vacuum limiter (Only vehicles of the Sweden version)

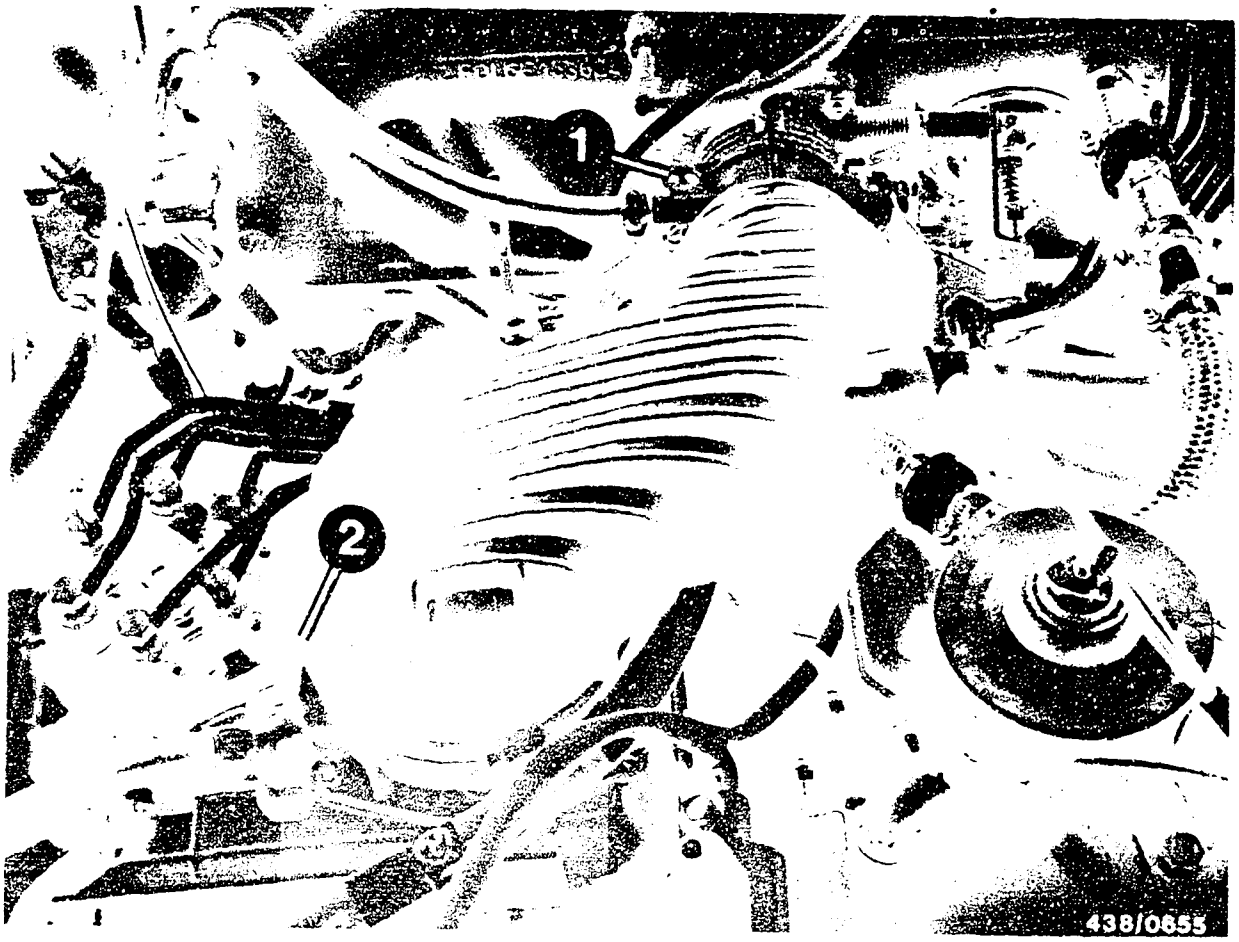
The vacuum limiter is a vacuum-controlled auxiliary-air valve which only opens on the overrun. In all other operating conditions the vacuum limiter must be tightly closed.

A leak test can be performed as follows:
Measure the idle speed with the vacuum limiter connected (engine at normal operating temperature). Then switch off the engine.

Remove the vacuum hose from the fitting on the vacuum limiter and seal off tight.

Start the engine again and measure the idle speed. It must not differ from the previous measurement. If the engine speed has dropped, the vacuum limiter has a leak. If it is leaking badly, the idle speed is too high and can no longer be adjusted.

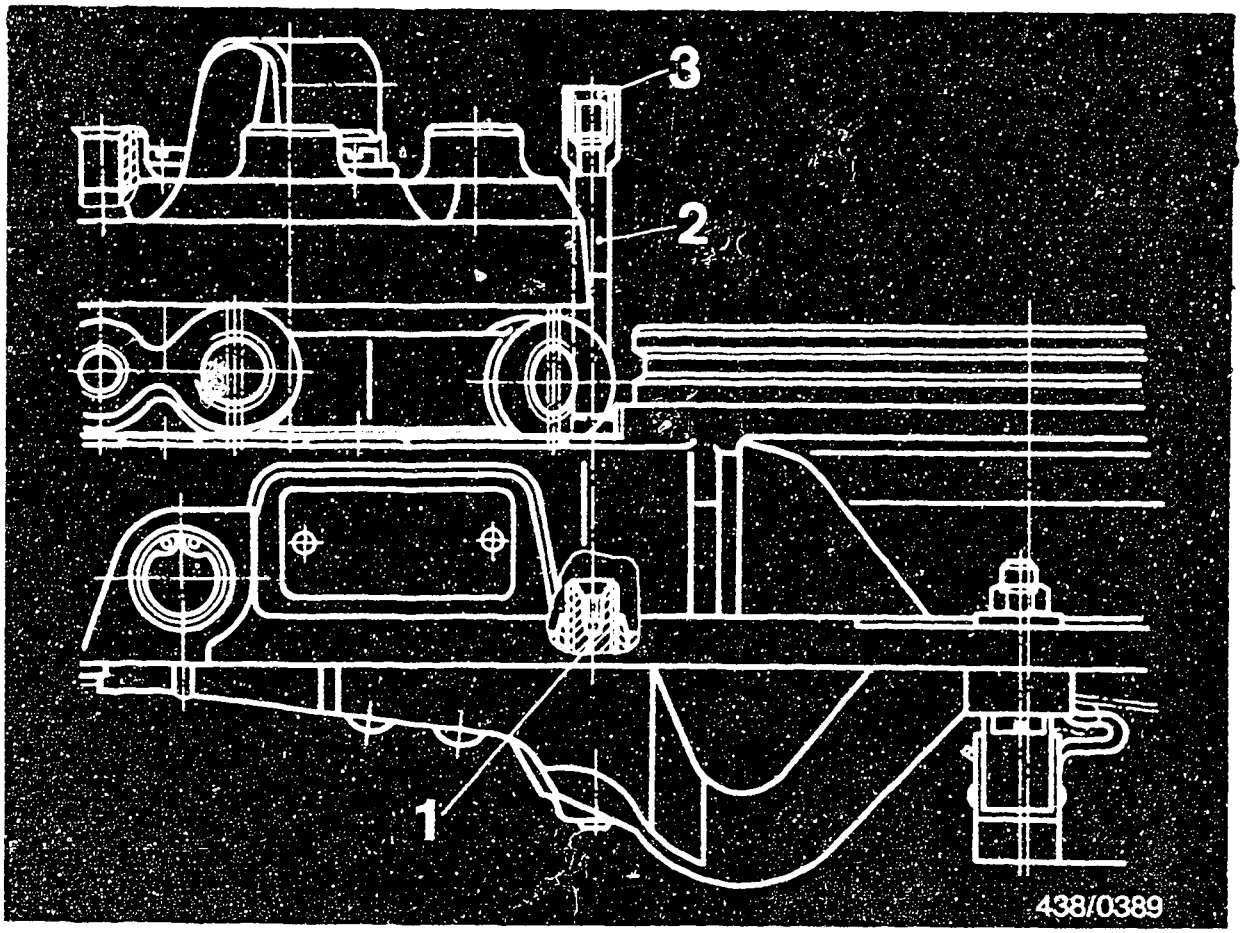
Replace the vacuum limiter if leaking.



The idle speed is adjusted at the bypass screw (1) with the air filter fitted.
Adjust the CO concentration at the idle-mixture-adjusting screw (2) in the mixture-control unit.

19.4 Test specifications and settings:

	BMW 323i	BMW 520i
Idle speed	800...900 min^{-1}	800...900 min^{-1}
CO concentration	1.0...2.0 % by vol.	0.5...1.5 % by vol.



Adjusting the CO concentration

The CO concentration is adjusted by turning the idle-mixture-adjusting screw (1) in the mixture-control unit using the adjusting wrench KDEP 1035.
After removing the safety cap (3) of the guide tube (2), the adjusting wrench is passed through the guide tube and inserted into the idle-mixture-adjusting screw.
Turning to the right = richer mixture
Turning to the left = leaner mixture

Caution: Always make the adjustment from the lean side, i.e. if the mixture is too rich turn the idle-mixture-adjusting screw further to the left than necessary and then turn it to the right up to the setting required.

After every adjustment remove the adjusting wrench and accelerate the engine briefly; so that the air-intake system can cool off. Then wait until the indicator of the CO tester has stabilized. Never accelerate the engine with the wrench still in place as this could result in bending the control lever in the air-flow sensor.

19.3 Anti-tamper device for idle-mixture-adjusting screw:

In the Federal Republic of Germany, § 47 of the FMVSS/CUR, "Exhaust Gases and their Discharge", has been amended. This amendment order was printed in full in the Verkehrsblatt 13 of 15th July 1975.
Accordingly, all motor vehicles with externally supplied ignition produced as of 1 October 1976 must be provided with anti-tamper devices for the idle-mixture-adjusting screw so that it is not possible to adjust the screw without destroying the anti-tamper device. The intention is to prevent non-experts from re-adjusting the idle setting and thus inadmissibly influencing the exhaust gas. Consequently, the anti-tamper caps may only be used in the workshop and must not be sold to customers for their own use.
These anti-tamper caps come in different colors. The cap to be used for the after-sales service of updraft air-flow sensors is red.
It can be obtained from Bosch under part number 3 430 522 002.
The anti-tamper device for the air-flow sensor is removed and fitted using special tools (e.g. No. 131 090 from Cartool Co., Hans Schubert KG, Unterer Grasweg 88,D-8070 Ingolstadt).

After-sales Service

Technical Bulletin

Packaging of goods under warranty

438

K-Jetronic (CIS)

VDT-I-438/101 B
10. 1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

BOSCH
...chäftsbereich KH Kundendienst Kfz Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

After-sales Service

Technical Bulletin

Securing of idle-speed adjusting screws

K-Jetronic (CIS)

438

VDT-I-438/102 B
11.1976

According to a statutory regulation, changes have been made to § 47 of the German traffic licensing laws concerning exhaust gases and their outlets. This regulation was printed in full in traffic law sheet 13 of 15.7.75 .

Consequently, all motor vehicles with external-ignition engines must have their idle-speed adjusting devices secured from the 1st October 1976, so that adjustment of the screw is impossible without destroying the securing device. This should stop unskilled people from adjusting the installation of the idle-speed system and thereby illegally influencing the emission values. As from now, securing caps can only be used in the workshop and cannot be sold to customers for their own use.

Securing caps are produced in various colors. For after-sales service the following caps and colors are used:

downdraft air-flow sensor
Blue — securing cap is not available from BOSCH. Part number is DB 000.997.59 86 from the Deutsche Vergaser Gesellschaft K 34 520

updraft air-flow sensor
Red — Part number 3 430 522 002

These stipulations are only valid in countries where ECE regulations (Economic Commission for Europe) apply. The air-flow sensors must however be converted for the use of these securing caps, as a matter of principle. The caps can also be used in countries not subject to ECE regulations, to prevent dirt penetrating through the pipe to the adjustment in the case of updraft air-flow sensors.

BOSCH
Geschäftsbereich KH Kundendienst Kfz Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

After-sales Service

Technical Bulletin

FUEL PUMPS 0 580 254 9..

with replaceable non-return valve

58
VDT-I-580/100 En
9.1978

On various new-model fuel pumps 0 580 254 9.., it is possible to replace the non-return valve. These pumps are recognisable by their light-metal housing and centrally arranged suction and pressure fittings. See also VDT-W-438/500.

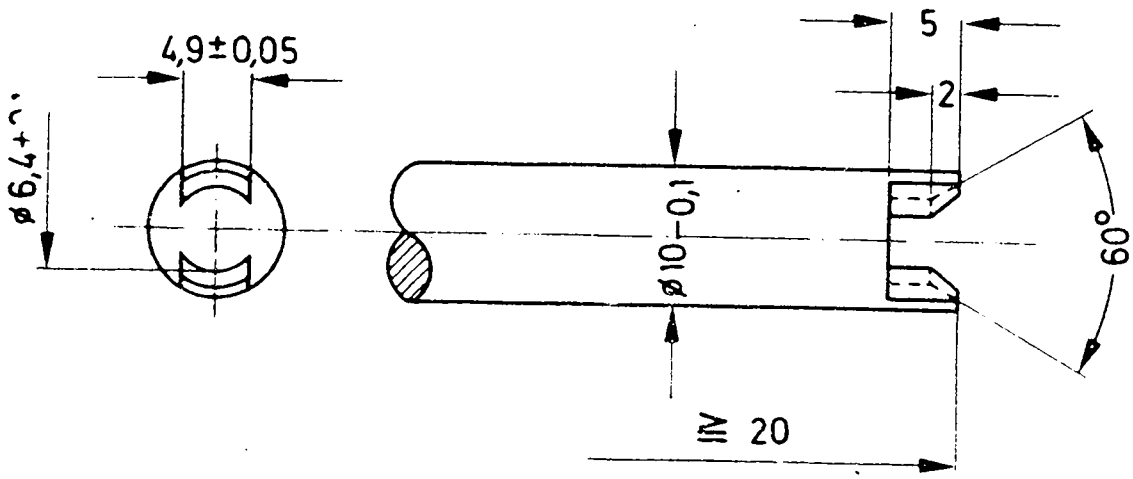
The non-return valve in question, together with the necessary O-ring, is available as a set under the part number 1 587 410 901.

Assembly

Clean the hose connection thoroughly at the pressure fitting and unscrew it.
Unscrew the non-return valve using a pin screwdriver (see Fig.).
Screw in the new non-return valve.
Do not over-tighten. Tightening torque of 0.4...0.6 Nm (4...6 kgf/cm) is to be adhered to.
The thread is plastic. The non-return valve is sealed with an O-ring.

Tool

Manufacture the pin-type screwdriver yourself according to the sketch. It can also be made from a conventional screwdriver with a 9...10 mm blade.



BOSCH
Geschäftsbereich KH Kundendienst Kfz Ausrüstung

After-sales Service

Technical Bulletin

EXCHANGEABLE NON-RETURN VALVES
in electric fuel pumps 0 580 254 ..

VDT-I-438/104 En
3.1982
(Replaces Ed. 9.1981

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 254 001	1 587 010 500	---	---
.. 002	.. 500	---	---
.. 950 }	1 587 010 006	---	---
.. 951 }			
.. 952	1 587 010 002	---	---
.. 953	.. 501	---	---
.. 954	.. 002	---	---
.. 956	.. 002	---	---
.. 957	.. 002	---	---
.. 958	.. 002	---	---
.. 959	.. 002	---	---
.. 960	.. 002	---	---
.. 961	.. 002	---	---
.. 962	.. 002	---	---
.. 963	.. 005	---	---
.. 964	.. 002	---	---
.. 965	.. 002	---	---
.. 966	.. 002	---	---
.. 967	.. 002	---	---
.. 968	.. 002	---	---
.. 969	.. 002	---	---
.. 970	.. 002	---	---
.. 971	.. 002	---	---
.. 972	.. 002	---	---
.. 973	.. 002	---	---
.. 974	.. 002	---	---
.. 975	.. 003	---	---
.. 976	.. 004	---	---
.. 977	.. 004	---	---
.. 978	1 587 410 901	---	---
.. 979	010 004	---	---
.. 980	.. 002	---	---
.. 981	.. 002	---	---
.. 982 ①	.. 003	---	---
.. 982 ②	1 587 410 901	---	---
.. 984	010 004	---	---

① = until FD 822 ② = from FD 823

BOSCH Geschäftsbereich KH Kundendienst Kfz-Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 254 985	...	1 583 385 006	1 580 203 002
.. 986	...	.. 386 011	.. 001
.. 987	...	.. 008	.. 001
.. 988	...	.. 008	.. 001
.. 989	...	.. 008	.. 001
.. 990	...	.. 385 004	.. 002
.. 991	...	.. 004	.. 002
.. 992	1 587 010 001	...	...
.. 996	...	.. 386 011	.. 001
.. 998	...	.. 385 004	.. 002

After-sales Service

Technical Bulletin

HOT-STARTING PROBLEMS

438

VDT-I-438/105 En
3.1980
Replaces Ed. 2.1980

K-Jetronic

Hot-starting problems can occur in various vehicles fitted with K-Jetronic. This means that when an engine is switched off whilst still hot and then switched on again after a short period, it does not start as well as it should.

The engine, the ignition system and the K-Jetronic system in these vehicles should be carefully checked. With the K-Jetronic particular attention should be paid to the:

complete system (in case of leaks),
injection valves (in case of leaks),
correct position of the air-flow sensor plate (rest position).

Instructions can be found in the vehicle-related repair manuals VDT-W-438/5.. .

If the engine still does not start satisfactorily when hot, even after checking, a timing relay can be fitted in K-Jetronic systems which are not equipped with a solenoid valve for reducing the control pressure as additional starting help.

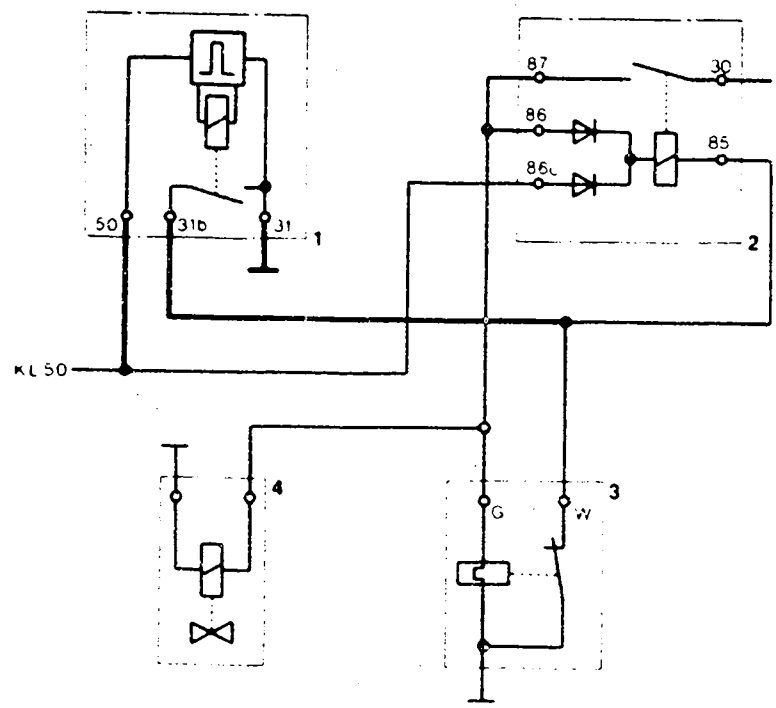
Timing relay 0 340 000 003 controls the start valve during hot starts. The start valve then injects extra fuel intermittently (sometimes cutting out completely.

The timing valve is fitted according to the wiring diagram (see reverse side). The fitting of this relay will be charged for.

After fitting the timing relay starting should be carried out as follows:

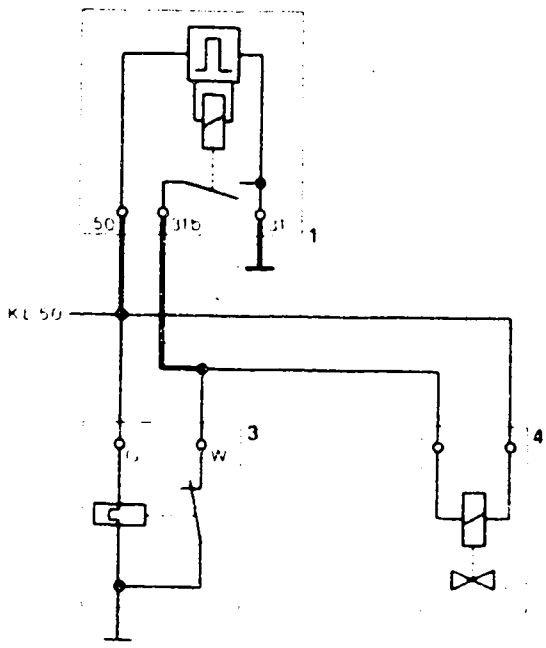
Vehicles with start valve in intake manifold - with open throttle valve,
Vehicles with start valve in idle duct - with closed throttle valve.

BOSCH Geschäftsbereich KH Kundendienst Kfz Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d Allemagne par Robert Bosch GmbH



K-Jetronic system with post-injection relay

1 = Timing relay 0 340 000 003
2 = Post-injection relay
3 = Thermo-time switch
4 = Start valve



K-Jetronic system without post-injection relay

After-sales Service

Technical Bulletin

FIRMLY FITTED NON-RETURN VALVE

Repairs
fuel pumps 0 580 254 ...

VDT-I-438/107 En
5.1980

Previously fuel pumps with non-exchangeable non-return valve (see VDT-I-438/104 En) had to be exchanged completely in cases of leakage in the non-return valve.

If the fuel pump is in working order and only the non-return valve leaks, there is now the possibility of repairs as part of after-sales service. 2 parts sets have been produced for this purpose, they contain, amongst other things, a tube fitting with built-in non-return valve.

Before using the parts set the installation conditions should be checked. The defective non-return valve can remain in the fuel pump which does not have to be dismantled for fitting the parts set. Before disconnecting the fuel lines the pressure fittings of the fuel pump and the fuel lines should be thoroughly cleaned.

Description and fitting

Parts set 1 587 010 003 for fuel connection with inlet union.

Screw the tube fitting (short side) with the thick flat seal ring into the pressure fitting and tighten. In doing so press against the hexagon of the pressure fitting with a wrench. Place the thin flat seal ring, the fuel-line inlet union and the other flat seal ring on to the long side of the tube fitting and tighten with the hexagon cap nut. Run the engine and check that there are no leaks in the connection.

Parts set 1 587 010 004 for fuel connection with nipple and union nut.

Screw the tube fitting with flat seal ring into the pressure fitting and tighten. In doing so press against the hexagon of the pressure fitting with a wrench. Screw the fuel line to the tube fitting with a union nut and tighten. Run the engine and check that there are no leaks in the connection.

BOSCH
Geschäftsbereich KH Kundendienst Kfz-Ausrüstung

After-sales Service

Technical Bulletin

O-RING FOR K-JETRONIC INJECTION VALVES
0 437 502

VDT-I-438/108 En
7.1982

For K-Jetronic injection valves with O-ring seals the O-ring is available as a service part under Part No.: 3 430 210 600.

This O-ring is also listed on service-part microfiche EE...* together with other Jetronic service parts.

* See microfiche EE00 under 0 280 ..

Since the O-rings are exposed to extreme temperatures, they should be replaced whenever service work is performed.
"Unmetered air" which is drawn in through leaky injection valve seals is a frequent cause of trouble.

Please direct questions and comments concerning the contents to our authorized representative in your country.

BOSCH
Geschäftsbereich KH Kundendienst Kfz Ausrüstung

After-sales Service

Motor Vehicle Service Information

EXPORT VEHICLES WITH
EMISSION CONTROL SYSTEMS

VDT-I-Gen. 042 En.
12. 1981

K-Jetronic and L-Jetronic

Export vehicles for countries with stringent exhaust emission regulations are equipped with various emission control systems. To meet the legal requirements, these systems are installed either individually or in combination, depending on the model version.

Emission control system	installed predominantly in export vehicles				
	Sweden	Australia	Canada	USA	Japan
Exhaust-gas recirculation*	●	●	●	(●)	(●)
Secondary-air induction*	●	●	●	(●)	(●)
Secondary-air injection*	●	●	●	(●)	(●)
Catalytic converter*	-	-	-	●	●
Lambda closed-loop control	-	-	-	●	●

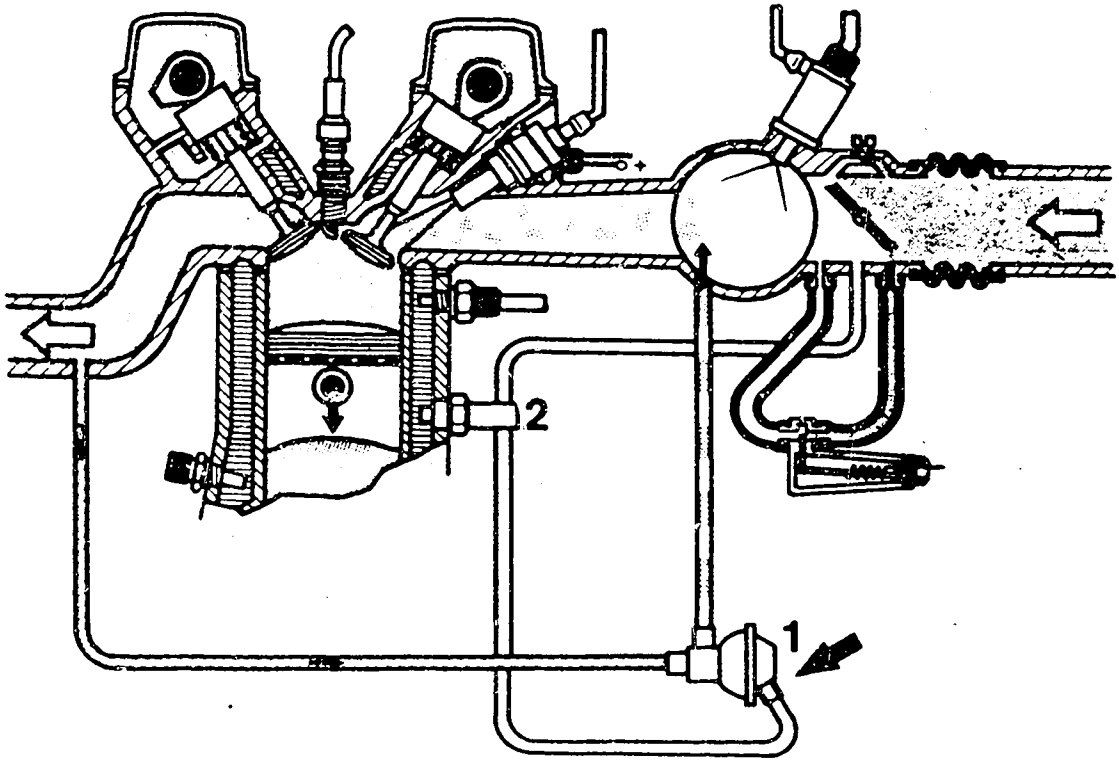
The vehicle-related After-Sales Service Instruction Manuals for the K-Jetronic and L-Jetronic describe the construction, function and operating principle of the emission control systems. The influence of these systems should be borne in mind particularly when adjusting the idle speed and CO concentration.

Export vehicles are sometimes also encountered in countries which do not have particularly stringent exhaust emission legislation. This Service Information publication summarizes the various emission control systems and provides information for the After-Sales Service in countries with exhaust emission legislation which does not require such emission control systems or unleaded fuel.

* Not made by Bosch

BOSCH Geschäftsbereich KH Kundendienst Kfz-Ausrüstung
© by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

1. Exhaust-gas recirculation (EGR)



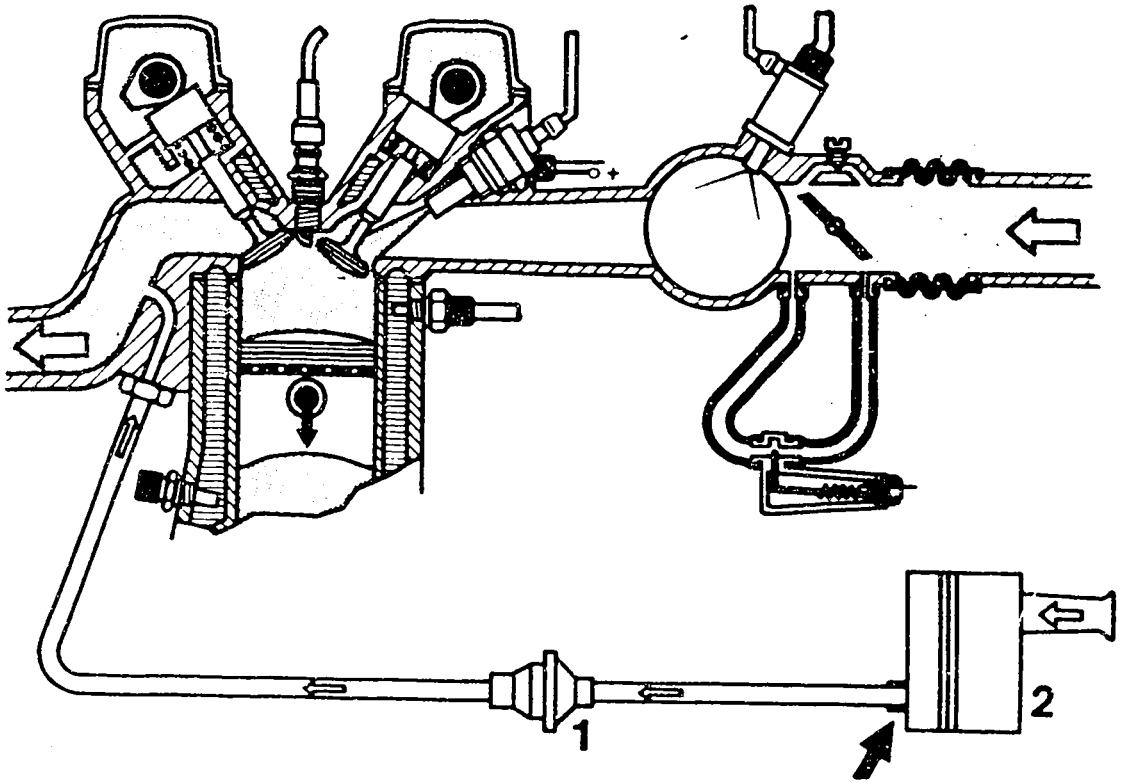
1 = Exhaust-gas recirculation valve 2 = Thermo-valve

Some of the exhaust gas is returned to the intake manifold via a vacuum-controlled exhaust-gas recirculation valve. This recirculation of exhaust gas into the combustion chamber lowers the combustion temperature and reduces the emission of nitrogen oxides (NOx). The thermo-valve and the position of the vacuum tapping port on the throttle-valve assembly ensure that exhaust gas is only recirculated when the engine is warm and only at part load. There is a reduction in engine speed of about 200 min^{-1}. Exhaust-gas recirculation is inoperative at idle, full-load and when the engine is cold.

When testing or adjusting the idle speed and CO concentration, remove and seal off the vacuum control line (arrow) on the exhaust-gas recirculation valve in order to ensure that the exhaust-gas recirculation system is inoperative.

In countries without stringent exhaust emission legislation it is not necessary to shut down the system.

2. Secondary-air induction (e.g. Volvo Pulsair system)



1 = Non-return valve

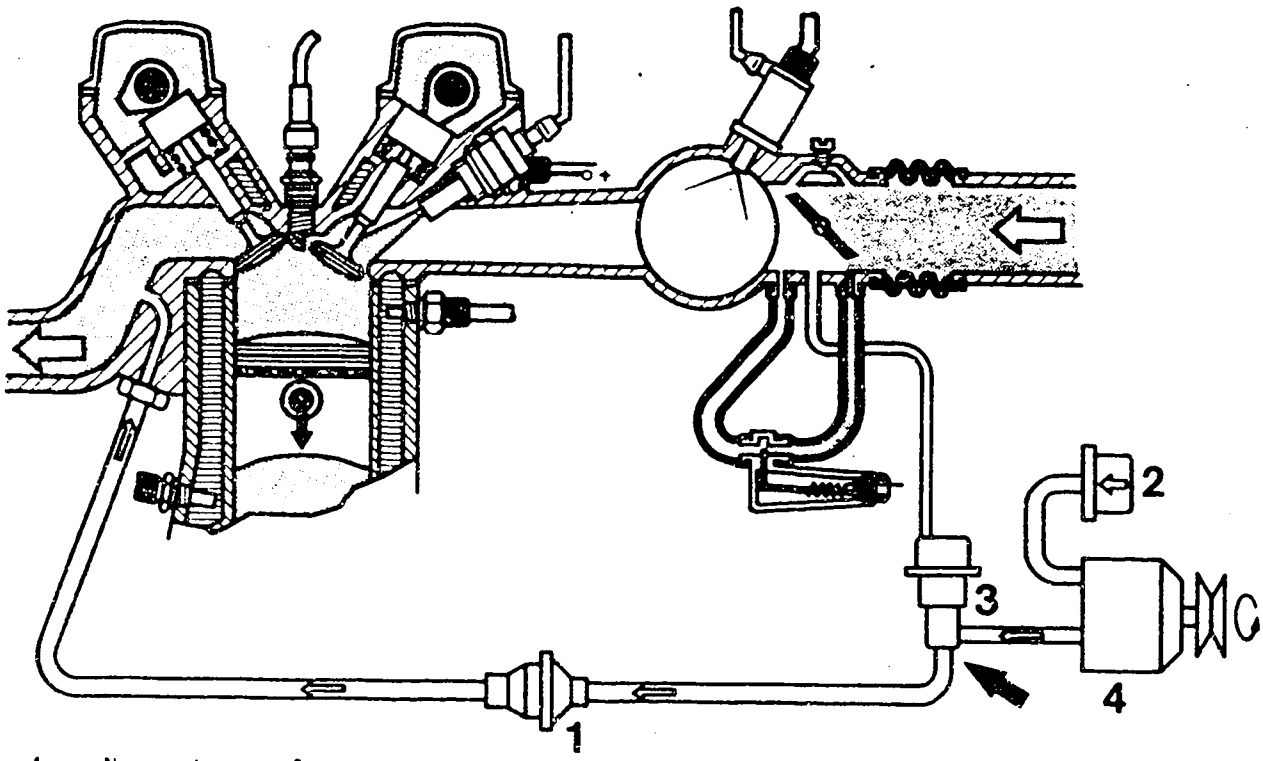
2 = Air filter

The pulsating alternation between overpressure and depression in the flow of exhaust gas inducts fresh air into the exhaust ports via a non-return valve. Unburned residues of carbon monoxide (CO) and hydrocarbons (HC) are partially after-burned, leading to fewer pollutants in the exhaust gas.

When testing or adjusting the idle speed and the CO concentration, the secondary-air induction system must be rendered inoperative. To do this, remove the hose between the non-return valve and the air filter on the air filter (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air induction system.

3. Secondary-air injection



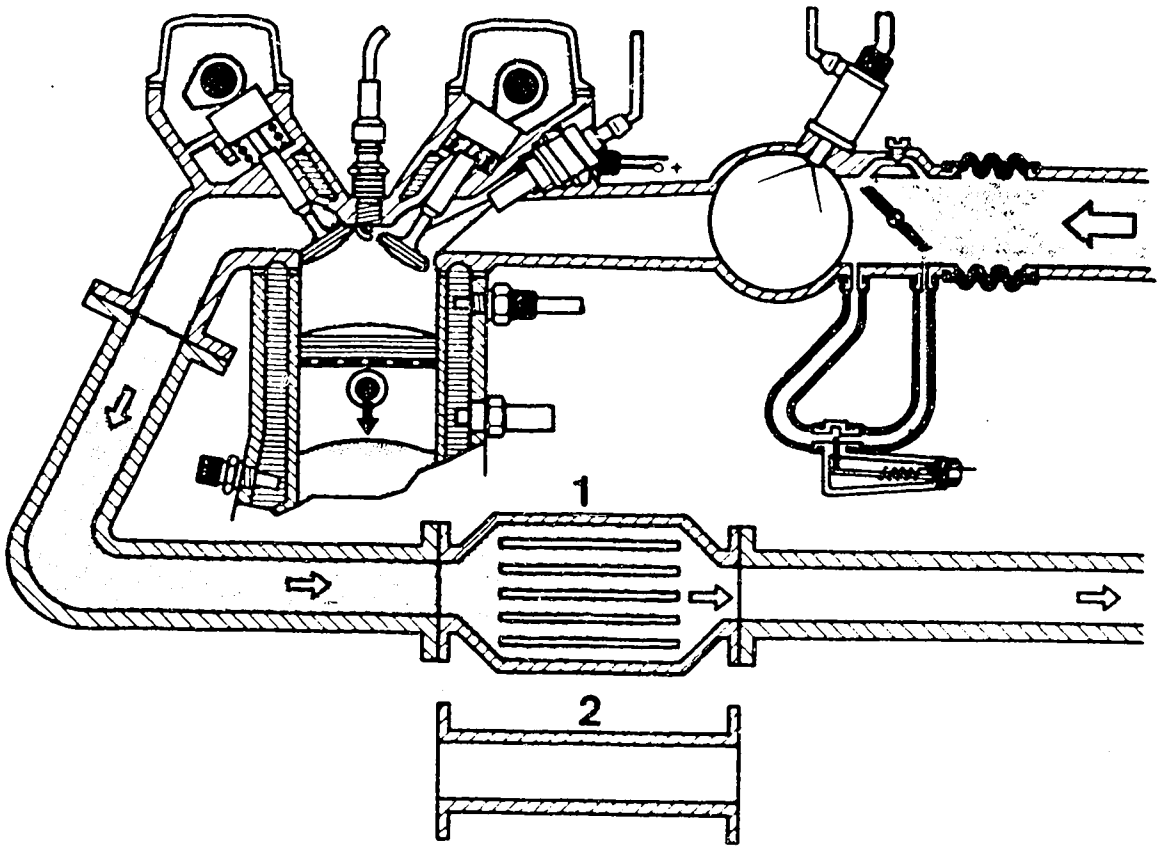
1 = Non-return valve
2 = Air filter
3 = Change-over valve
4 = Air pump

An air pump driven by the engine inducts fresh air through the air filter and forces it via a non-return valve into the exhaust ports. As in the case of secondary-air induction, there is a partial after-burning of the CO and HC residues. This makes the exhaust gas cleaner. A vacuum-controlled change-over valve controls the operation of the secondary-air injection system.

When testing or adjusting the idle speed and the CO concentration, shut down the secondary-air injection system. To do this, remove the hose from the outlet of the change-over valve (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air injection system.

4. Catalytic converter



1 = Catalytic converter 2 = Intermediate pipe

The single-bed catalyst installed in the exhaust system in export vehicles (also with lambda closed-loop control) reduces all three pollutants CO, HC and NOx to a minimum. The catalytic surface triggers chemical reactions of the pollutants, rendering them non-toxic.
Important: Proper operation only possible in conjunction with unleaded fuel (at present only in USA and Japan).

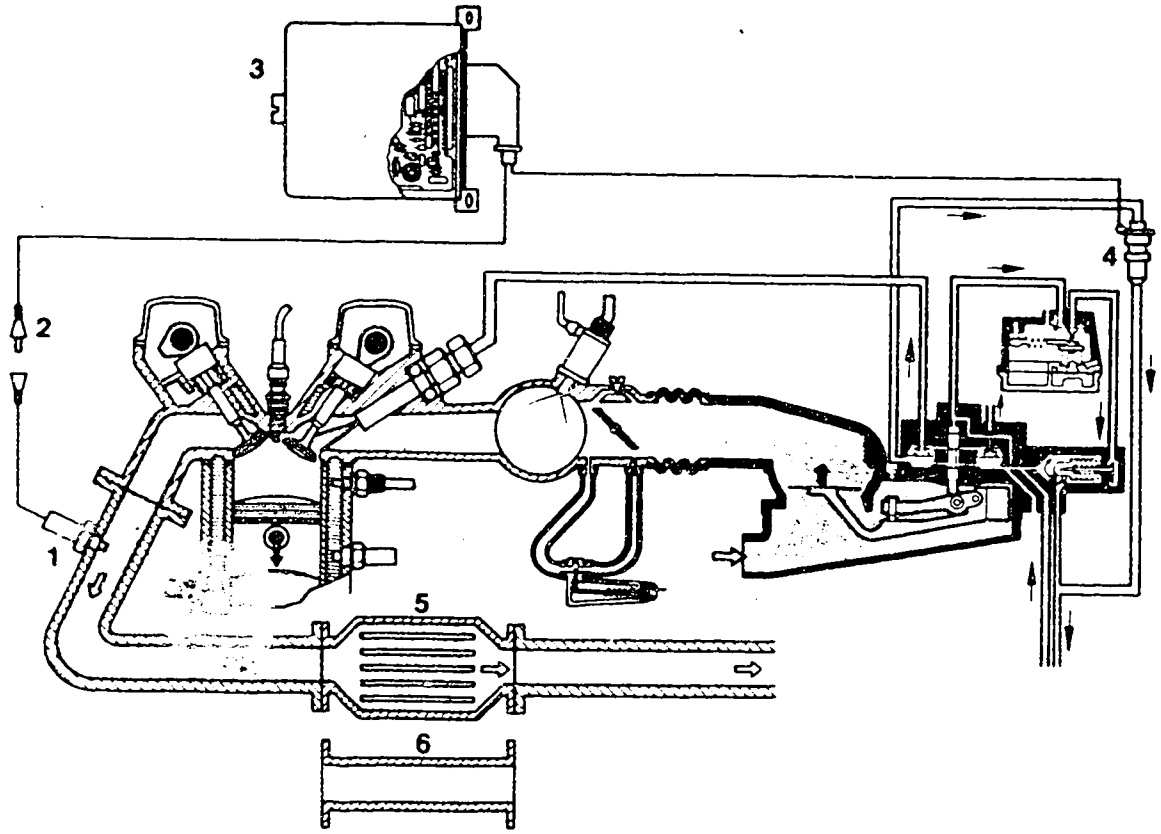
When testing or adjusting the idle speed and the CO concentration, the catalytic converter can be neglected since the exhaust-measuring point is upstream of the catalyst.

Caution!

If the vehicle is operated on leaded fuel (predominantly in countries without stringent exhaust emission legislation) the catalytic converter must be removed. If not removed, the catalytic converter would become clogged up and lead to a reduction in the power output of the engine.

Appropriate intermediate pipes for converting the exhaust system are available from the vehicle manufacturer.

5. Lambda closed-loop control



1 = Lambda sensor
2 = Plug
3 = Control unit
4 = Timing valve
5 = Catalytic converter
6 = Intermediate pipe

Export vehicles for the USA and Japan are equipped with lambda closed-loop control. This additional function of the K-Jetronic or L-Jetronic is not a downstream emission control system, but ensures a low pollutant content in the exhaust gas by means of optimum mixture preparation. Additional exhaust-gas recirculation, secondary-air induction or secondary-air injection is therefore not necessary in most cases. Like the catalytic converter, the lambda sensor (in the exhaust gas) operates only with unleaded fuel.
If the vehicle is operated on leaded fuel, the lambda sensor becomes clogged up and ceases to operate. The control unit detects this and switches from closed-loop to open-loop control. The system then operates on a fixed air-fuel ratio in the same manner as a K-Jetronic or L-Jetronic without lambda-closed-loop control. Before operating on leaded fuel, the lambda sensor should be removed and the installation hole should be closed off with a screw plug M18x1.5 (length of thread max. 8.5 mm). The disconnected plug (2) of the sensor connecting cable should be insulated and fastened to a suitable place on the vehicle body.

Caution!
Under no circumstances must the control unit or the timing valve be shut down on the lambda closed-loop control of the K-Jetronic.
The catalytic converter should be replaced by an intermediate pipe.

Published by:
Robert Bosch GmbH
Division KH
After-Sales Service Department
for Training and Technology
(KH/VSK)

Table of contents

Table of contents (continued)